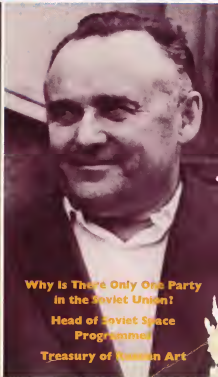


sputnik

MONTHLY DIGEST

1971
January **I**



**Why Is There Only One Party
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Letters to the Editor

Thank you for SPUTNIK April 1970 dedicated to V. I. Lenin. It was very interesting. After reading my SPUTNIKS I usually give them to my friends to enjoy.

Enjoyed following articles:

"Three Sources and Three Components Parts of Marxism";

"The Soviet Army";

"Conference on European Security";

"Siberia Looks Toward the 21st Century";

"Theist — City from Legend";

Letters to the Editor.

Would like to see feature article "Travel in the Soviet Union".

Louis Meyer, Philadelphia, USA

Your magazine has been well received in the German Democratic Republic. It holds appeal mostly for students and young people. I, myself, am a student at the Mining Academy and therefore I read the article about the Soviet iron-and-steel industry (March, 1970) with special interest. I wish you would publish more articles about Soviet space achievements.

Günter Stephan, Kurort Seiffen,
German Democratic Republic

I have been reading SPUTNIK magazine for several years now, and find it quite a welcome change from most magazines.

...In your elaborate descriptions of a new steel mill complex in a recent issue you did not once mention anything about preventing the pollution of air and water by the plant. I attribute much of the past destruction of the US through pollution to

a reckless capitalistic economy. I had always hoped that the Soviet government would be more farsighted. I would like to know what, if anything, is being done in the Soviet Union to avoid and stop pollution.

Carl Opperman
1113 Clover St.
South Bend Ind. 46615 US

In the article about Soviet iron and steel industry we left out, for reasons of space, some aspects which, in our opinion, were not central to the problem (social effects of scientific and technical progress, for example).

In some of the earlier articles, SPUTNIK had turned to the problem of pollution (December 1968; June, 1969; January, 1970; February, 1970).

To give you a qualified answer we referred your question to the Ministry for the Iron-and-Steel Industry. Below is a reply by two experts on the problem, Yuri Molchanov and Valentin Staritskiy:

"In 1967, the Ministry for the Iron-and-Steel Industry set up an All-Union Joint Research and Design Institute to fight pollution around iron-and-steel establishments. The Institute has a staff of over one thousand people whose job is to recommend concrete measures for creating healthy conditions around eighteen iron-and-steel works. One such health programme — to clear the air in the area of the Magnitogorsk Combine — was completed in 1970, while others will go into effect in the near future.

There are also other institutes and laboratories which are doing similar research.

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Over the past three years the number of gas purifiers installed at the leading iron-and-steel works has been doubled. And over the five-year plan period (1971-1975) the air space around metallurgical plants will be completely freed from industrial dust. We expect this part of the health programme to be completed in the 1970's.

Similar measures have been worked out for large bodies of water, such as the Caspian Sea and the Rivers Volga and Ural. These will have been enforced within five-to-seven years by using the so-called water rotation supply method with which the waste water is put back into the industrial process and does not get into the surrounding area until it has been completely cleared of harmful impurities. At present about 50% of the amount of water used by the Soviet iron-and-steel industry goes back into the technological cycle.

In non-ferrous, chemical, power construction and some other industries, similar programmes are either under study or have already gone into effect."

Editor

I am a Pakistani Muslim temporarily resident in Britain.

In the June issue I read with great interest the article on Azerbaijan. As an Asian I would appreciate if you would kindly publish from time to time informative articles on different Asiatic republics of the USSR.

M. Saleem, London, England

Anyone wishing to know more about Soviet republics can do so by reading articles about

Georgia — July, 1967; May, 1968; February, 1970.

Azerbaijan — March, 1969; June, 1970.

Turkmenia — September, 1967.

Tajikistan — April, 1967.

Kazakhstan — February, 1968

Uzbekistan — January, November

and December, 1967; June, 1968; January, 1969.

Kirghizia — December, 1970.

SPUTNIK is planning to publish more articles about Soviet republics in subsequent issues.

Editor

The first time I read SPUTNIK was in 1967 when I decided to take up philology. And indeed SPUTNIK helped me to get to know the Soviet Union. Since then I have been reading it with absorbed interest. I like its design and also the stories it prints. And I also find a lot of recipes of the Russian cuisine I am so fond of.

Still I think your magazine could do with a bit more material on folk art from different republics and national regions of the USSR.

Leonarda Apenowicz, Swiecie, Poland

I've been a SPUTNIK reader since it first came out in 1967. I keep all the issues and from time to time leaf through them, reading and re-reading the more interesting articles and admiring the pictures. But I still have a little grudge against you. Over the years SPUTNIK has been coming out, it has not carried a single item about floriculture. I am sure a well-illustrated article on the subject would be greatly appreciated by all lovers of flowers.

Tamara Hanutova, Liberec, USSR

May I take this opportunity to congratulate the publishers on the nice set-up, printing and paper and the excellent photographs, especially the colour photos. But except for a few very good articles, the reading material is not generally very attractive to arrest the attention of the general reader. More of humorous skits and cartoons besides

Continued on p 7

sputnik

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SPUTNIK: read — be informed! We welcome your questions, comments and suggestions which will be reported in the Letters Section of **SPUTNIK**.

Sincerely,
The Editors

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Karolev.
Photo by Igor
Snegirev



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Continued from p. 5

articles on health, family and social life and scientific discoveries and developments can make the magazine more attractive and a treasure to preserve. I hope you would continue to give more and more of the beautiful photos of nature.

Bala Jagannathan, Cochin, India

I work as a teacher in a primary school.

I send my warm greetings to all the staff of **SPUTNIK**. May our friendship grow stronger and stronger.

We, dear friends, know what kind of difficulties and problems you met during the second world war, and how you carried out the good ideas to save your country from the dirty criminals. Your photographs on page 96 in the May 1970 issue were so clear.

Now, in our time, before our very eyes, the same crimes are being committed in many parts of the world, and yet these murderers are still going unpunished.

Y. B. Al-Ghazawi, Nasriya, Iraq

I am a keen amateur photographer, and I think the photographs appearing in **SPUTNIK** are extremely good. There are some interesting trips around the USSR on the pages of your magazine, which enrich our knowledge of your country. But the most fascinating articles are those devoted to science, technology and art. The humour, in combination with all the rest of the contents, gives a better understanding of Soviet people. I should like to see more verse by modern poets, and also cookery recipes from the various nationalities of the USSR, which lately you have been giving very irregularly.

Jerzy Horbik,
Swidnica, Poland

The New Year in Russia

It is hard today to believe that the New Year was once celebrated in Russia not on the First of January but on another day.

The years come and go, old traditions disappear and new ones take their place. Exactly 270 years ago, on "September 1, 7208 years since the Creation of the World," the citizens of Moscow were preparing to celebrate their New Year — as they had done since the 15th century. However the holiday never took place. The messengers of Peter the Great announced on Red Square that "from now and forever" September 1 was to be an ordinary day of the week. After December 31, 7208, the new year would be marked on January 1 of the year 1700 of the Christian era — as it was known in other European states.

On December 31, at midnight, Peter the Great himself opened the festivities. He lit a firework which exploded with a loud bang, showering bystanders with sparks, ashes and soot. The chimes of church bells floated over Moscow, cannon were fired in the Kremlin and military bands began to play. The gates of the

Kremlin were decorated with fir, pine and juniper branches which gave off a strong, tangy smell of the forest. By special royal decree the festivities were to last for a whole week. Peter also made it compulsory for people to greet one another on the occasion. Every home was supposed to have a fir tree, which was also an innovation — something the Russians had never done before. That was how the New Year was first celebrated in Russia on January 1.

Times have changed since then, many local traditions survive in different parts of the country, but certain elements remain constant.

New Year is a time of feasting. The succulent, mouthwatering smells of roast duck and goose, turkey and chicken fill the air. Tables groan under caviar, smoked salmon and an endless variety of delicacies and tic-bits.

And can one imagine New Year without the glittering, lit-up fir tree in the room? Or without the Fir Tree Number One — the beautiful, giant tree in the Kremlin?

We are accustomed to the good wishes and greetings that are exchanged at this time of year. At one time they were actually superstitious incantations, magic formulae that were to ensure good fortune in the New Year. The superstitions have vanished, the tradition remains.

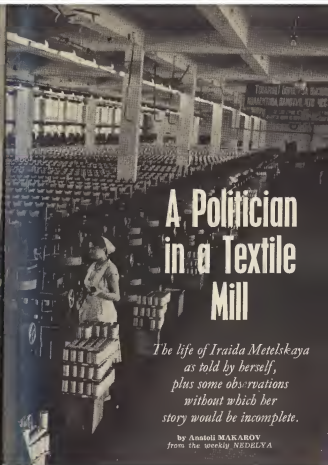
In Science Town, in Novosibirsk, before sitting down to table the people throw open the doors of their homes for a moment. This is to symbolize that all are welcome at the holiday feast.

In many towns and villages of the Soviet Union people still maintain the old custom of going out on New Year's night. It is a time of carnivals, fetes and new friendships, rejoicing and merry-making. After drinking good cheer people go to the central square of the town and gather round a gaily decorated fir tree, dance, toboggan down the ice slides and ride on merry-go-rounds and sleds . . .

In the Far North beribboned reindeer pull sleds decorated with silver bells, while in the central regions the famous Russian troikas with their bells whip along

the snowy, sparkling roads to the accompaniment of singing and laughter. Craftsmen mould figures of the Snow Maiden and legendary knights and the Witch's House on chicken's legs which comes straight out of a fairy tale. And the mummers! They walk from door to door wearing masks and speaking in riddles interlaced with old sayings and bits of penny wisdom. Wherever they go they are greeted with smiles, given the best of food and seen off with cheers.

In some parts of the country, especially in the Ukraine and Byelorussia, an old poetic ritual still persists when people get together and chant holiday greetings in chorus. And in the last few hours of the old year the mummers, led by Grandfather Frost and Snow Maiden crowd the streets, knocking on doors, singing songs and ditties which are then followed up by a dance in which the milling crowds take part. Sometimes they visit hospitals and railway stations to extend greetings and a kind word to those who are sick and those who are far away from home on this wonderful New Year's night.



A Politician in a Textile Mill

*The life of Iraida Metelskaya
as told by herself,
plus some observations
without which her
story would be incomplete.*

by Anatoli MAKAROV
from the weekly NEDELYA

Lenin was convinced that equality of women involved their extensive participation in public and state activities. Before the 1920 elections to the Moscow City Council, Lenin said: "Elect more working women to the Council, both communists and non-communists, as long as they are honest workers and can do good, conscientious work."

These words fully apply to Iraida Metelskaya, a weaver at the Darnitsa silk factory, which is located in a suburb of Kiev.

However, let me begin my story from our first meeting.

At half past three in the afternoon we were sitting on a bench near her factory gate. It was a beautiful sunny day in May, with a fresh breeze coming from the Dnieper, with poplar fluff floating in the air and with the fragrance of flowering chestnut trees. It was the end of a shift. Suddenly I thought that a man brought up on old-time concepts could well doubt that these cheerful young women leaving the factory, with elegant ladies' bags, could really be weavers. He would imagine they were students doing practical training, or perhaps visitors. But then, I said to myself, the old industrial suburb, with its unending squalor and tasteless gimcrackery, has long been a thing of the past.

Iraida Metelskaya remembers

this industrial settlement as it was during the war and shortly afterwards: the poorly-baked, rationed black bread, her orphaned life — her father was killed at the front and her mother died — the crowds of vocational school trainees hurrying to the factory at half past five in the morning, war cripples with empty sleeves, and her girl friends, undernourished, wearing quilted jackets and soldiers' boots. She remembers everything...

Iraida Semyonovna Metelskaya, an industrial training instructor and currently a member of the USSR Supreme Soviet, has taken part in framing many decisions of state importance. But at no time, whether in the St. George Hall of the Moscow Kremlin, in the lobby of the Palace of Congresses, or in ministerial reception rooms, has she ever forgotten who she is and where she came from.

"I have been an industrial training instructor since the age of 17," she says. "I finished a vocational school and a school for assistant foremen, then I became a forewoman myself. We wove cloth for great coats. Even now I train weavers in the Gobelins department: I have been used to weaving thick cloth since wartime. It is a pleasure to train girls: now they all come to our factory with 10-year schooling. But after the war I myself was

their age, and my trainees were ex-soldiers. They had gone to the front as boys but returned mature men. But men without trades. I was supposed to teach them to make essential minor repairs on weaving machines. You can imagine their attitude — a kid of 17 and I was going to teach them! Their male pride was wounded and not infrequently they made rude remarks when they were upset. Today I can laugh about it but at the time I felt like bursting into tears. I tried to win their respect by strictness, and never smiled."

Iraida Metelskaya told me all this without hurry, with frankness, as if recalling things to herself, summing up experiences, joking at her own expense and rejoicing at the fact that she had gone through difficult and trying experiences with dignity, without complaints.

As she talked to me Iraida Metelskaya now and then took a pencil and drew a diagram or jotted down an important figure. At such moments I noticed her habit of explaining things patiently and unobtrusively. Her words were full of common sense and it was all typical of her — it could be seen in her eyes, which, from time to time gleamed with a smile which appeared in the middle of a conversation, or it showed in some

witticism. She is easy to talk to. I felt no barriers whatsoever.

"I can't divide my working and deputorial duties into two different categories. Judge for yourself. I am a weaver, so I am concerned with all problems facing our light industry. As a deputy I have on many occasions visited our Union Minister. We have discussed many things, but mostly equipment. I can tell you that he has never once denied my requests. One of our plants is now being equipped with 170 new pneumatic, shuttleless machines — Soviet, Czechoslovak and French. At the Ministry everyone knows me by sight. At one of the sessions I met our Minister and the moment he saw me he said: 'Well, my dear, please don't ask for anything else till the end of the year. We have exhausted all our resources.' I laughed and said, 'No, this time I have no requests.' That is, I had no requests to the Minister. But I had to visit various ministerial departments, such as the labour department. Most of us in light industry are women. Do you realize how many specific problems we face? People tell their deputy everything. They complain, make suggestions and criticisms. So I have to consult experts.

"Of course, the voters raise not only production problems. Have you seen the left bank of the



Deputy Iraida Metelskaya with her daughter Lusya.

Dnieper in Kiev? Beautiful, isn't it? Take Darnitsa, or Rusanovka, or Bereznyaki. We have a population of 340,000 — enough for a whole regional centre. People have said: let us have our own theatre on our left bank. So I visited our Union Minister of Culture. The ministry studied the request and has now given us a positive answer."

Iraida Metelskaya is not an engineer, still less an economist or a lawyer. But she can sit up all night over some involved technical or economic or legal reference-book and spend her day-off trying to alleviate somebody's personal trouble. People come to her as they would to a doctor, at any time of the day.

Several days after our meeting

at the factory I met her in town. The chestnuts were in blossom. The golden cupola of St. Sophia Cathedral was shining in the sun. High up in the sky swallows were circling at jet-like speed. Together with Iraida Metelskaya and her elder daughter, Lusya, who was about to finish school, I roamed the well-known Kiev hills, steep in one place and gently sloping in another.

Iraida Metelskaya is of medium height, with a nice ordinary face. Her biography, tastes, views, habits — all go to make her one of millions of ordinary Soviet working women — wives, mothers, sisters. That is what she is like, Iraida Semyonovna Metelskaya, a Kiev weaver and member of the Supreme Soviet of the USSR.

Beyond this bridge across the Dnieper, beyond sandy beaches, lies Darnitsa, a major industrial suburb of Kiev, capital of the Ukraine. The inhabitants of Darnitsa have chosen the weaver Iraida Metelskaya to represent them in the Supreme Soviet.





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Young Estonian Musicians



The composer Dmitri Kabalevsky often
conducts the children's orchestra himself.

The Law of Beauty

by **Dmitri KABALEVSKY**, composer, People's Artist of the
USSR and vice-president of the International
Society for Musical Education of Children and Adolescents

from *KOMSOMOLSKAYA PRAVDA*

Aesthetics has literally invaded all fields of life. To know its laws, to understand their inner substance, to use them as the measure of our life and our behaviour is the duty of every man whatever his occupation. At no other time have so many people taken part in the aesthetic education of children and adolescents as today.

Art in whatever form, be it music, drawing or acting, gives rise to creative fantasy, sows the seeds of creation. Therein lies the main significance of a universal art education for young people. In other words, the rudiments of creation must be developed in every person right from the early years of his life. And the tremendous force which is art must, in my opinion, be assigned a decisive role in this, must be brought home to children and adoles-



During the ISME Conference nearly 3,500 children took part in performances by 22 groups.

Music is capable of moving the ethical side of our soul, and therefore should be included among the subjects of youth training.

Aristotle

cents, for it is undoubtedly accessible to all of them without exception.

Once a young woman brought her seven-year-old daughter to a music teacher and said: "Do you think my daughter

should study music, geography, physics, daughter will study does she have any talent history?" geography, chemistry, for music?" The mother looked and physics and history.

By way of reply the blank. You take this for granted, although your question: "And is your the teacher conti- daughter may not necessarily follow any of these daughter talented in nued. "At school your

Those who are unable to love nature and to whom music is non-existent are poor people because they are deprived of the greatest pleasures and the glorious moments of life that no amount of worldly wisdom can give.

Mikhail Glinka, Russian composer

courage and cowardice, love and hatred? In contrast, art, beginning with ditties, pictures, films and theatre performances, can do this admirably.

I would like to say in this connection that children and adolescents are able to comprehend much richer and more complicated musical creations than hitherto suspected. Here is an example.

The symphony concerts for senior school children organised jointly by the Union of Soviet Composers and the All-Union Radio in one of the best concert halls in Moscow included Tchaikovsky's Sixth Symphony and Beethoven's Fifth. At first we were afraid that the programme would go over their young heads. But our fears were groundless as the concerts were a tremendous success.

Does this mean that we want to take away from young people light

occupations. Why then should art, or music for that matter, be taught only to the elect?

It is obvious that only exceptionally gifted children who truly have a feeling for music and a desire to devote their lives to its pursuit should go in for music professionally. However, a general musical education should be extended to all children. Nevertheless, the main aim of musical studies in general education schools should not be the study of music as such. The key thing is that through music it is possible to influence the inner world of the student and above all his morality.

The words of a famous Russian physician and scientist, Vladimir Bekhterev, have great significance in this connection. He concluded a lecture on the role of music in the aesthetic education of children with the following words:

"I am convinced that

the aesthetic and therefore moral make-up of man's personality to a large measure depends on a thoroughly elaborated programme of musical education from an early age."

Once I received a letter from a boy who wrote: "My name is Seryozha. I am seven years old. I am fond of music and want to study it. When I hear the overture to the opera 'Carmen' I feel happy and want to do something good..."

And truly, no textbook can evoke in a child as vivid an understanding of moral values as the arts can. What textbook can explain to him the difference between good and evil,

We need musical creations that will become a part of our life, and it is necessary therefore that truly artistic music should be harmonised with the demands of the masses.

Anatoli Lunacharski, People's Commissar (Minister) for Education

music for entertainment? Of course not. I think that every normal person should be able to appreciate a good joke, to dance, to enjoy himself. And light music could just as naturally become part of anyone's life, even that of a very serious person. On the other hand, one must always remember what genuine musical culture can offer us, must see the difference between music for en-

Love and study the great art of music, for it will help you come still closer to the ideal man which is our aim in a communist society.

Dmitri Shostakovich

tertainment and music and bad. Just start as a great art. treating him to "little nothings", "titillating titbits". Do this day after day, month after month, narrow his aesthetic world down to influences — good just this sort of enter-

Many general education schools in the Soviet Union have not only their own children's choirs, but orchestras as well.



tainment and soon it will pall and he will want more and more acute sensations.

Art can both win a man over and merely entertain him. Genuine art which carries a message of thought and feeling cannot be hurt by transient fads and fashions. It can live through centuries, enriching the spiritual world of man, it never ages, just as the great works of Bach, Mozart, Beethoven and Tchaikovsky never age.

One well-known American teaching expert said recently: "Bach, Beethoven, Brahms, move over and make room for 'rock'!" If this was meant as irony, I would be pleased to appreciate its sad incisiveness. But I am afraid he was quite serious when he said it. To this we say: "Beat, rock, pop and all the

rest, move over! Entertain youth, but don't strangle them, don't rob their spiritual world, don't deprive them of the joy which only communion with the great art of all ages can provide. And never cease learning from the great masters!"

That is why it is so important, from the earliest age, to foster in children the sense of beauty inherent in genuine art and to build up an aesthetic immunity against shallow banality in order to help the young man or woman to find his or her way through the complexities of modern life.

All these and other questions were discussed at the International Conference on Musical Education for Children and Adolescents which was held in Moscow in

July 1970. The conference was attended by 1,100 members of ISME (the International Society for Musical Education set up in 1953 under the auspices of UNESCO) from 41 countries. Also taking part in the conference were leading composers and music teachers.

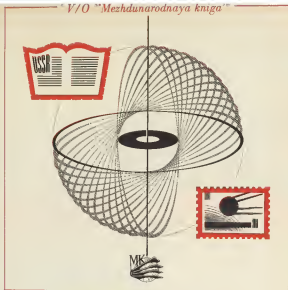
Soviet Prime Minister Alexei Kosygin sent a message to the conference which read in part: "International cooperation in musical education for the youth will undoubtedly promote mutual understanding and trust among nations."

The ISME conference elected its leading bodies and agreed to hold the next conference in Amsterdam in July, 1972. The conference re-elected the Australian music teacher Frank Callaway President of the organisation.

In a speech delivered at the final concert in the Kremlin Palace of Congresses, Mr. Callaway expressed his deep gratitude to the Soviet Government for its assistance and contribution to the organisation of the conference.

Just start out by giving your child a violin for a birthday present.

Gustav Ernesaks, Estonian composer



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By Vsevolod DEMIDOV
from the magazine
VOKRUG SVETA

Road



Across the Sands

On construction site of highway linking Hodeida with Taiz, Oleg Chursinov shows a Yemeni lad how to do it.

No blueprints or reports could give the team of Soviet experts who went to Yemen to help build a road across the desert any real idea of the conditions under which they were to live and work.

The road was to link Yemen's second largest city, Taiz, with the country's biggest port of Hodeida which had also been built with Soviet assistance. It was to traverse the Tihama coastal desert, a trackless region which had never known a wheeled vehicle. Trucks or carts could not move



This is where the highway will be.

in its deep sand and all transportation depended on camels.

In three GAZ-69 lorries the team set off, accompanied by two of their Yemeni colleagues, to inspect the route the road was to follow. In the first lorry were the project chief Zabidi and the Soviet chief construction expert Yuri Petrov-Semichiev with their interpreter Tariel Gasanov. In the second Vladimir Nikulin, the chief engineer, was having a discussion with his superior Hussein;

An industrial base for the road was set up 12 miles from the port of Hodeida.



The ancient city of Hodeida on the shores of the Red Sea.

the remainder of the Soviet team were in the third lorry.

It was 6 a.m. when the lorries bumped into the first ridge of shifting sand just after they set off. Even at that hour the heat was unbearable — the engines were over-heating, the ventilators were sucking in sand with the air and the radiator tubes, burnished by the sand, shone brightly in the sun.

"The first eighteen miles are the hardest," commented Zabidi dryly.

At first the going was very slow as one after another the vehicles became bogged down to the doors in the shifting sands and the cross-country vehicle accompanying the convoy was kept busy dragging them out. Then the sand became more closely packed and they

made better time. The driver of the first truck, Sasha Gontar, even began to hum a tune... then, suddenly the wheels were deep in sand again.

"It's a wadi," said Zabidi, and Tariel explained that a wadi is a dry watercourse which can fill with water in a flood although in the dry season it becomes one great sand drift.

They struggled across about 125 miles of desert that day, and towards evening they reached the town of Hais where an advance party of Soviet experts had already set up a small staging-camp. There was a makeshift hostel and running water from a bore-hole they had drilled. But already the hostel was alive with snakes and scorpions — they were creeping all over the beds



and the floor. Pointing to a small snake by the door, Zabidi nonchalantly said: "Death!"

The party in no time decided to sleep on the roof; there was a little breeze and they could watch the stars. It was really no cooler but the darkness gave the illusion that the heat had lessened.

Talking quietly against the background of soft music from the radio, Petrov-Semichev and Nikulin discussed the job.

"You can see now why the Americans have shied off any construction work in the Tihamma," Petrov-Semichev said. "Even the devil would break his legs here... And those wadis... All our equipment could be washed away without a trace in a second... Try to guess when it might rain in the mountains... And this heat...!"

"And we'll only build from one direction?" Nikulin guessed, expressing Yuri's chief unspoken worry. "And where shall we get sufficient skilled labour? We have 2,000 lorries standing idle. Will we be able to train thousands of drivers? We've only a handful of instructors."

"Don't worry, Vladimir. We'll cope. Things will look better in the morning. There's nothing like a good night's sleep," was the reply...

The project was officially inaugurated on March 28, 1966. Most of the machines were still without drivers, but a start had been made to train them. The Yeme-



Taiz — second largest city and an important trade centre of the country.

nis were enthusiastic learners. Sometimes they were too eager and attempted to take on the modern machines too soon, so that there were accidents. The three driver-instructors worked unremittingly until they almost dropped with exhaustion.

Work went on day and night at an industrial base which had just been built complete with all the necessary plant and workshops. There concreters, riggers and welders were being trained. The geologist Nikolai Kovalevsky travelled all over the desert and up into the mountains searching for drinking water and rock suitable for road-building, and marking sites for future quarries. Lebedev, a driller, was putting down bores all over the place, from which brackish water flowed. The people of the mountains regarded him as a great chief and brought him presents of dried berries. Water was at a premium here and the Russians said that the water from the bores was for everybody...

Gradually things began to improve and finally there came the memorable day when 37 bulldozers started out into the desert leaving behind them a smooth 18-yard wide strip, cleared of the low prickly desert weed. Behind them came graders, scrapers and tip-up lorries. The bed of the road stood out — flattened by

heavy rollers, it was covered with gravel...

But the earlier misgivings of the Soviet expert proved justified. Progress was terribly slow, with the work proceeding from one end only. Then it was decided to take a risk by trying to get machinery over the desert in order to start from the other end too.

It was an extremely difficult operation to get the column over the roadless expanse. The heavy machines stuck in the sand, the tractor engines overheated and stopped, but finally the job was completed and work started from the opposite end.

The problems were almost insuperable. The sand drifts went into motion with the dawn. Sandstorms blotted out the sun but this had no effect on the intense heat. Now it was coming not only from above, but from all sides, as in an efficient oven. Wind undid much of the work unless the builders were able to cover the rolled layer with gravel very quickly. The ground seemed to evaporate into the scorching desert air.

As Zabidi had said, the first eighteen miles were the worst, but finally the day came when the two parties met up. It was a day of celebration.

By this time it was hard to tell

the Russians from the Yemenis; all were equally bronzed. Everyone wore the Yemenis' simple thonged sandals — *shambalas* — and only the shorts worn by the Russians distinguished them from the Yemenis in their traditional robes.

There were great celebrations around the many camp fires that night. Whole sheep were barbecued and all the workers mingled to feast on the succulent mutton. Interpreters were unnecessary for during the months of work together a strange language, a mixture of Russian and Arabic words, had come into use. Here and there a quiet song was heard. Then, suddenly, one of the Yemenis leaped into a circle of fire and, to the accompaniment of hands beating on empty kerosene tins, danced tempestuously.

Yuri smiled. "The first celebration. Little by little the *Tihama* is surrendering."

But there were still many problems. Yuri's greatest concern was the bitumen... There was trouble with the ferro-concrete bridges... The gravel and the sand. Half a million cubic metres of gravel was needed. Rock had to be blasted from the mountains, transported to the crushers and then screened. And the wadis! Only recently the atten-

tion of a supervisor had relaxed and a sudden flood in the mountains had swept away a bulldozer and some heavy concrete slabs.

But the bitumen was what really worried him. Even in Moscow it became so soft in the summer that heels left their imprint in it. What would happen here in the desert where the temperature reached 50° C. (122° F.)? He thought it would flow like oil.

His days were long and busy travelling from one place to another inspecting the work, checking on progress, seeing to it that things were up to standard in the mobile camps — that the showers worked and the food was good. And all the time in the back of his mind was this worry about the bitumen.

But the problem was solved in an unexpected way. As the first few feet of bitumen were laid, the desert itself came to the rescue. Sand, carried by the wind, settled on the sticky black surface and turned it into a stone-like sealing medium.

Only then did Yuri take a break and he went off to visit Sana, the capital of Yemen. He was interested to see this city with its broad streets lined with pepper-trees and the clay fences to keep out the goats. He noticed the many-storeyed houses which

lined the streets and liked the plaster work with which they were decorated. But what impressed him most of all was the lavish adornment on the entrance to every home. Even the meanest shack had heavy carved doors patterned with copper-headed nails.

A few days after his arrival Slava Gerasimov, one of the engineers from the second road-building party, came to Sana and the two got together to talk things over. Yuri knew Slava as a man of boundless energy and at the same time a certain diffidence — which did not, however, prevent his getting tough to achieve a necessary end. They

Sana, capital of the Yemeni Arab Republic.

had been friends for some time and had often swum together in the Red Sea on their days off.

The two of them sat down gratefully under a fan. "We're working at night," Slava said. "It's unbearable to be anywhere near the bitumen during the day. We're working by floodlight and the road's growing by the hour. The only trouble is the mosquitoes, they're attracted by the lights in their millions, and there's no escaping them. Mice get stuck in the fresh tar, and once there was even a scraggy fox stuck fast. We washed its paws with petrol and set it free..."

Late in the night as they lay half asleep listening to the local noises, Yuri, thinking aloud,



The Tihama desert. For the time being it can still only be crossed on camels.

said: "Imagine that the road is finished and you and I are racing along in a jeep with the wind in our faces... The Tihama seems to have disappeared... there's the wadi where we were first

stuck... here's where the power station went out of action... here our builders worked without water..."

In September 1969 this dream came true. They drove down the straight new road across the now-tamed Tihama.

There was a big ceremony. Yuri made his final report. It was full of statistics — tons and cubic metres and so on, but behind those dry figures the people could see that wonderful new road, the shining strip across the Tihama.



Soviet equipment on one stretch of construction.



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Why is the Communist Party the only political party in the Soviet Union? Why does this party — a social and not state organisation — assume responsibility for the economic, social, political and cultural life of the country? In various forms, these questions come from our readers.

By way of reply, SPUTNIK offers two articles by Yevgeni Bugayev. The first one is given below and the second, "The Party and the People", will appear in our next issue.

by Yevgeni BUGAYEV,
M.Sc. (History)

from the magazine SOVIET LIFE

WHY DOES THE SOVIET UNION HAVE ONE POLITICAL PARTY?

The party of Bolsheviks* — the Communist Party of the Soviet Union — was created by Lenin as the supreme form of class organisation of the proletariat, a specific class, the only class in history that strives to gain power not in order to perpetuate its rule but in order to eliminate all classes and all rule of society by any class or group. It is this specific mission and position of the working class that

determines the specific mission of its political party in society.

In acting as the vanguard of the working class fighting for socialism the Communist Party considered the interests of all categories of the working population. In its very first programme (1903) in addition to the socialist demands of the proletariat, this Leninist party formulated a plan for a solution of the agrarian question — in the interests of the

* The Bolsheviks were Lenin's supporters and won a majority at the Second Congress of the Russian Social-Democratic Labour Party (RSDLP), the congress that virtually founded a revolutionary Marxist party in Russia. This party was called the RSDLP (Bolshevik) until its Seventh Congress in 1918, which renamed it the Russian Communist Party (Bolshevik), the RCP (B). Later, when the Soviet Union was formed it became the All-Union Communist Party (Bolshevik) — AUCP (B). Since 1952 it has been known as the Communist Party of the Soviet Union — CPSU.

working peasants — and of the national question — in the interests of the oppressed peoples and of the unity of the working people of all nationalities in the struggle against all forms and manifestations of oppression and exploitation.

In this sense the Communist Party of the working class has, since its very inception, objectively been a party of all working people. In the course of two revolutions (1905-07 and February 1917) the party of Bolsheviks was able to convince the working people, through their own life and struggle, of the correctness of its policy. It won the support of the working class and later the majority of all working people. It proved to the non-proletarian sections of the working people, above all, to the poor peasantry, that their basic interests coincided with the interests of the working class.

The "secret" of the Leninist party's success as the sole leader of the October 1917 Revolution lay in the fact that only its policy and its programme for revolutionary transformations met the basic interests of the working class and all toilers. The October revolution confirmed in actual fact not only the possibility but also the necessity of uniting the socialist movement of the working class with the broad all-democratic movement of the people, of wedding the struggle for socialism to the struggle for democracy.

The Party of Bolsheviks

The February 1917 revolution overthrew the czarist regime. While the revolution set up organs of power of the workers and peasants — the Soviets — the bourgeoisie, with the help of conciliatory parties, formed its own government. The basic social problems were yet to be settled. Every class sought to settle them in its own way. That made an acute political struggle inevitable, and it found its fullest reflection in the struggle between political parties.

In the arena of political struggle the interests of the working class were expressed by the Leninist party of Bolsheviks — a party of revolutionary Marxists. It had just emerged from underground, and most of its leaders were in emigration or just returning from prison or exile.

Decades of fierce police persecution had left their mark, and by the time it emerged into the open, the Leninist party had a membership of about 24,000. However, that party consisted of experienced revolutionaries steeled in struggle. Over 60 per cent of the membership came from the industrial workers, about eight per cent from the peasants, and more than 25 per cent from the office workers. The majority of the members were professional revolutionaries — lifelong fighters for the cause of the working class, for communism. The party was welded

together ideologically and organisationally. It had cleansed its ranks of opportunists and while engaged in strictly clandestine work had retained close ties with the working class. Once it was able to work openly the party started intensive work with the masses and quickly began to re-establish its organisations, thus developing into a mass party of the working class.

After Lenin returned from emigration on April 3, 1917, the party confidently led the working class toward a socialist revolution. It held a position clearly formulated by Lenin, on the questions of war and peace, on the attitude of the proletariat and its party to the other classes and parties, on the working-class, agrarian and nationalities questions.

Lenin's plan for a transition to a socialist revolution was based on a thorough study of the conditions of the day. He associated the solution of all the problems of close concern to Russia's working masses with the question of power. Power for the Soviets, peace and freedom for all peoples, bread for the hungry, workers' control over production, land for the peasants — such, briefly, was the Bolshevik programme for struggle.

In advancing the slogan "All Power to the Soviets!", Lenin had in view the peaceful development of the revolution, which appeared possible as a result of the tremendous superiority of the forces

of revolution over the forces of reaction. The Bolsheviks did not link the transfer of power to the Soviets with the preliminary expulsion from the Soviets of members of other political parties which were calling for class collaboration with the bourgeoisie. They were certain that either the so-called democratic parties which enjoyed popular confidence would under pressure from the masses divorce themselves from the capitalist class or, by their conciliatory practices, would antagonise the masses and in the course of elections be replaced in the Soviets by real representatives of the working people. Lenin relied upon the experience of the masses. "We do not want the masses to trust our word," he said. "We want the masses to rid themselves of misconceptions through their own experience."

History confirmed the correctness of Lenin's viewpoint. Vast numbers of Russia's workers, soldiers and poor peasants compared the words and deeds of different parties and drew conclusions favourable to the Bolsheviks. The Leninist party was rapidly gaining prestige and ascendancy. Its ranks swelled. By the Sixth Congress in August 1917, the party had 240,000 members. By the time of the October armed uprising it totalled over 350,000 members, this in spite of the fact that it was the only party to deny membership to fellow-travellers and

casual elements'. On the day of the October revolution, October 25, 1917 (Old Style Calendar), Bazarov, a Menshevik-Internationalist, writing in the newspaper *Novaya Zhizn* (New Life), was forced to admit: "The nucleus of the Bolshevik party is the cream of the Russian working class, its best-organized, most class-conscious, staunchest and most creatively gifted part."

The Other Parties

In the revolution the proletariat was opposed directly by the bourgeoisie. It was relatively small but held in its hands the country's economic levers. In the political struggle the bourgeoisie had been represented since 1905 by three parties: the Octobrists (in essence, monarchists), the Progressists and the Cadets, (Constitutional Democrats) or, as they called themselves, the Party of People's Freedom.**

However, right after the February revolution the Octobrists and Progressists, due to their extreme unpopularity, left the

scene and the bourgeoisie rallied around the Cadet party which skilfully protected the interests of all exploiter classes. Its programme, embellished with slogans of patriotism and freedom, actually boiled down to the elimination of the Soviets and the establishment of absolute power of the bourgeoisie in the form of either a constitutional monarchy or a bourgeois parliamentary republic. The Cadets called for the imperialist war to be waged "to a victorious conclusion" and for the retention of capitalist and landlord property ownership and the inequality of the country's nationalities.

At the time, a big role in the country's social and political life was played by the petty bourgeoisie (a greater part of peasants, artisans, small traders, owners of service establishments, and a section of the intelligentsia). The political loyalties of that motley mass which numbered many millions constantly vacillated between the bourgeoisie (since they were property owners) and the proletariat (since they were also

toilers). On the all-Russia scale that mass was represented by the parties of the Mensheviks and the Socialist-Revolutionaries.

The Mensheviks, who called themselves a party of workers and even Marxists, represented the reformist, opportunist wing of the Russian Social-Democratic Labour Party, set up in 1898. After the split at its Second Congress, in 1903, the Mensheviks actually became a separate party, with its own central institutions and organs of the press. Its main support came from the urban petty bourgeoisie, and the middle and lower sections of the intelligentsia. It also included the least class-conscious workers. That party was not subjected to persecution, was legal and collaborated in many ways with the bourgeoisie, but the revolution found it in a state of disarray.

Within menshevism there were trends that were divided on minor issues but were brought together by the certainty that Russia was not ripe for a socialist revolution. The result of the revolution, the Mensheviks assumed, would have to be a transfer of power to the bourgeoisie. As they saw it, Russia had to go through a long period of capitalist development until her working class comprised the majority of the population and learned to govern the country. Consequently they sought to build up the power of the bourgeois Provisional Government.

The Mensheviks were the chief opponents of the Bolsheviks in the struggle to win over the proletarian masses. However, they could put forward no solution to the most urgent issues then facing the working class and the rest of the population. Objectively, their political activities played into the hands of the bourgeoisie. So the outcome of their struggle with the Bolsheviks for the popular masses was determined in advance.

In fact upholding the interests of the bourgeoisie, the Mensheviks called upon the workers to give up their claims for an eight-hour working day and higher wages and to make sacrifices "on the altar of their country" so that Russia could carry on the imperialist war. They sought to persuade the peasants to leave the landlords' estates untouched and even renounced their own old programme of land municipalisation. The Mensheviks had no definite stand on the nationalities question. To a considerable extent they supported the idea of national cultural autonomy but opposed political autonomy and the right of nations to self-determination. In effect, that meant support for the great-power policy of the bourgeoisie, and so their programme found no support among the oppressed peoples.

On all major issues of practical politics the Mensheviks acted in concert with the Socialist-

* On March 18, 1917 the Bureau of the RSDLP (B) Central Committee adopted a decision that the party could extend membership only to people who presented recommendations from two of its members.

** The party held its First Congress in 1905. It opposed the czarist regime because it did not satisfactorily safeguard the interests of the capitalists. Its leader, Milyukov, became head of the Provisional Government after February 1917. The Cadets renamed themselves the Party of People's Freedom. Its strength was not made public but judging by some data it ran into tens of thousands. Its Central Committee of 1917 numbered 86 members, including three princes, one countess, one baron, some two dozen top industrialists, bankers, traders and landlords. The rest were academicians, professors and other intellectuals.

Revolutionary Party (SRs)* — the principal opponent of the Bolsheviks in their struggle to win over the peasants. They represented the wealthiest sections of the peasantry in the main. At the first stage of the revolution, their old slogans of socialisation and equal distribution of land, the proclamation of a republic, an eight-hour working day, and also their endless pseudo-revolutionary phrase-mongering, won them the backing of a substantial proportion of the peasants, the soldiers, the urban petty bourgeoisie and the least class-conscious workers. Later, fearing that the seizure of the landlords' estates would lead to a break with the bourgeoisie, this party, at its Third Congress, in May 1917, even formally renounced its programme for socialisation of land. Following this, there was acute disorder in its ranks.

The Masses Make Their Choice

The period from February to October 1917 was a testing time, when Russia's working people compared the programmatic statements and practical actions of all the political parties. The masses were making their choice.

The very first crisis of the new bourgeois government caused the Socialist Revolutionary and Menshevik leaders to put through

the Petrograd Soviet a decision to set up a coalition government. Six "socialists", among them Tsereteli, Skobelev, Chernov and Kerensky, entered the government of the imperialist bourgeoisie. During the counter-revolutionary rebellion of General Kornilov (August-September 1917), their leaders rejected a Bolshevik proposal to set up a government responsible to the Soviets (the Bolsheviks did not demand any ministerial posts) and remained with the counter-revolution, thereby signing their own political death warrants. At the elections to the Soviets the working people all over the country began to replace them with Bolsheviks. In a matter of weeks the Mensheviks dropped to the status of a third-rate party, commanding a negligible number of votes. The Socialist Revolutionary party by then was "now not so much an army fighting for its ideals as an arena of struggle between different elements," confessed their own weekly *Partiyniye Izvestiya*.

By October a countryside crisis had matured in Russia. The war, hunger and devastation were leading to destruction. The working class took a militant stand against the government. Lenin had every reason to write: "We have the support of the majority of a class, the vanguard

of the revolution and the vanguard of the people, which is capable of leading the masses."

The countryside also rose against the "socialist" ministers. The period March to September 1917 saw 5,631 cases of peasant action. Without waiting till land was given them by the Mensheviks and Socialist Revolutionaries, the peasants, on the advice of the Bolsheviks, took it themselves.

The Bolsheviks won over the majority of the soldiers on the main fronts and in rear garrisons. Relying upon support from the vast majority of the people led by the working class, the Bolsheviks, under Lenin's leadership, prepared the overthrow of the bourgeois government so thoroughly and ensured so impressive a numerical superiority of the revolutionary forces that the Provisional Government failed to offer any resistance worth speaking of and was swept away*.

The first decrees of the Second Congress of the Soviets, which formed the workers' and peasant's government headed by Lenin, were the Decree on Peace and the Decree on Land. The conciliators lost millions of vacillating supporters. From a Bolshevik government the people received what they had expected

from the Mensheviks and Socialist Revolutionaries in vain. The Soviet government took the initiative and acknowledged the independence of Finland and Poland. "The Declaration on the Rights of the Peoples of Russia", promulgated in November, gave equal rights to all the nationalities in the country and proclaimed the right of each people to self-determination up to and including the right to set up their own state. That ensured the new government support from the working people of the non-Russian outlying areas. The Bolshevik party won the full confidence of the people.

Bolshevik Attitude to Other Parties

To this day, in the West there is an idea — widely propagated by Socialist Revolutionary, Menshevik and bourgeois writers — that "having gained power accidentally, the Bolsheviks immediately used it in order to destroy all their political opponents".

In fact, this is what happened.

The exposure of the official leadership of the Mensheviks and Socialist Revolutionaries as collaborators of the bourgeoisie led to splits and disintegration in the ranks of these parties. The Bolshe-

* The odds in favour of the revolution and the complete impotence of the Provisional Government were revealed by the fact that during the days of the October Revolution six people were killed and 50 wounded in Petrograd while during the February bourgeois-democratic revolution some 1,500 people lost their lives.

* Founded in 1902. Took over some ideas of populist socialism and the tactics of individual terrorism.

viks then backed those groups which had taken the road of internationalism and supported the power of the Soviets.

By the time of the October Revolution, the United Internationalist Social-Democrats had split from the Mensheviks. A rather influential group called Mezhrayontsy (including Uritsky, Volodarsky and Trotsky) declared agreement with the programme and tactics of the Bolsheviks and, at its own request, was granted membership of the party at the Sixth Congress of the RSDLP (B). The numerical strength of the Mensheviks was declining disastrously and their influence on the working class was practically nil. In March 1917 the circulation of the Menshevik *Rabochaya Gazeta* ran to 100,000 but by September it had dropped to somewhere between 10 and 15,000. On October 4, 1917, the Socialist Revolutionary newspaper *Delo Naroda*, which sympathised with the Mensheviks, announced the "disappearance from the political arena of the party of Social-Democrats, Mensheviks," and called it a "staff without an army". Thus, Russia's working class, even before it took power, had overcome a split in its ranks and rallied around the Bolshevik Party.

The evolution of the Socialist Revolutionary Party is still more indicative. The expansion of the peasant movement strengthened its left wing which reflected the interests of the poor and middle

peasants. Without breaking with the party formally, the left-wing Socialist Revolutionaries actually formed an independent party as early as July 1917.

On the eve of the October Revolution, the left-wing Socialist Revolutionaries, with their demand for equal tenure of land, expressed, in essence, the feelings of the majority of peasants. That was why the Bolsheviks advanced and pursued the idea of an alliance with the left-wing Socialist Revolutionaries, an expression of the idea of an alliance of the workers and peasants.

By proposing a government bloc to the left-wing Socialist Revolutionaries, the Bolsheviks offered to consolidate "on top" (i.e., at the level of political parties) the alliance of workers and peasants. That was not a parliamentary combination but an agreement of the proletariat with the nonproletarian sections of the working people, with the aim of attracting them to the building a new society. Lenin called it "an agreement with the petty bourgeoisie not in the sense of narrowing the tasks of the socialist revolution but exclusively in the sense of the forms of transition to socialism for individual sections of the petty bourgeoisie".

Such is the class basis of the possibility of the existence of a multi-party system under the dictatorship of the proletariat. It stands to reason that the ruling communist party cannot form

government blocs with parties that oppose socialism, whatever names they assume. That would be a betrayal of the cause of socialism.

The existence of one political party is not a general law of the socialist revolution and socialist construction. Many countries which are successfully completing socialist construction have, alongside Marxist-Leninist parties of the working class, other political parties, which voice the interests of allied classes and social groupings (the peasantry, craftsmen and other small urban property owners and a sizeable proportion of the intelligentsia). In the Polish People's Republic, alongside a Marxist-Leninist Party of the working class, the Polish United Workers' Party, there is the United Peasant Party and the Democratic Party, the latter uniting sections of the artisans, craftsmen and intellectuals. A similar situation exists in the German Democratic Republic, where several parties acknowledge the need for a socialist reconstruction of society. Representatives of these parties are members of their country's legislative bodies and government and cooperate in a popular front; experience shows that such cooperation bears fruit.

In Soviet Russia the two-party government was short-lived. The left-wing Socialist Revolutionaries, who in December 1917 held seven posts of the 18 in the Soviet government,

themselves broke up the government coalition. After the conclusion of the Brest peace treaty with Kaiser Germany they withdrew from the government while remaining in the Soviets. Later, in July 1918, they raised an armed anti-Soviet rebellion. Because of their policy, they antagonised the working peasantry, lost their social support and after many splits left the political scene, just like the other petty bourgeois parties whose leaders, in the course of the Russian Civil War, took the side of the White Guards and intervention troops. The best members of these parties, who really advocated the struggle for socialism, joined the Communist Party. It is worth noting that at the Tenth Congress of the RCP (B) which was held in 1921 after the end of the Civil War, in which leaders of the Socialist Revolutionaries, Mensheviks, nationalist parties etc. had fought the Bolsheviks with arms in hand, 24.6 per cent of the delegates were former members of those parties. At the Eleventh Congress in 1922, such members accounted for 16.7 per cent; at the Twelfth Congress in 1923, for 14.7; at the Thirteenth Congress in 1924, for 11.6; and at the Fourteenth Congress in 1925, for 10.2 per cent.

Soviet power never banned democratic parties or denied them political existence. The Socialist Revolutionaries and Mensheviks, though they refused to collaborate with the Bolsheviks, freely

took part in the elections to the Soviets. At the height of the Civil War, the Menshevik leader, Martov, made an anti-Bolshevik speech to the Eighth Congress of the Soviets. The leader of left-wing Socialist Revolutionaries, Maria Spiridonova, admitted: "The right-wing Socialist Revolutionaries and Mensheviks were routed not by some extraordinary repressions or shame-faced pressure, but by their own former conciliatory policies. The masses did indeed turn away from them. Regional and district congresses met freely, and no dispersals or arrests took place. There was a free struggle of opinions, a dispute between parties, and the results of elections all over the country revealed the complete scorn of the masses for the conciliatory parties of Socialist Revolutionaries and Mensheviks. They flickered out in a vacuum." After the Civil War these parties, one after another, dissolved themselves, which meant that they acknowledged the untenability of their pro-

grammatic and tactical principles. Thus, by 1920, the parties of left-wing Socialist Revolutionaries, Maximalists, Populist-Communists and Revolutionary Communists (all were shades of Socialist Revolutionaries and Anarchists) had all dissolved. After the split at the 1920 Twelfth Conference, the left wing of the Bund* decided to join the RCP (B) in 1921. Still earlier, in March 1920, the Ukrainian left-wing Socialist Revolutionaries — Borotbists, were granted membership of the CP (B) of the Ukraine at their own request.

Thus, in the course of a bitter struggle, which was given an added impetus by the imperialist intervention, the working people of Russia, having tested dozens of political parties, recognised as the sole proponent of their interests the party of Lenin. Since then, in the Soviet Union, only the party of communists has borne responsibility for the political guidance of society. That was how the Soviet Union formed its one-party system.

* The Bund, the General Jewish Social-Democratic Union, was a petty bourgeois nationalist opportunist party. It was founded in 1897 in western Russia. After February 1917 the Bund allied itself on all vital issues with the Mensheviks. Losing support, most of its right-wing leaders emigrated from Russia.

News from the Soviet Union

To the Moon and Back Without Risk to Life

ZOND-8, SOVIET AUTOMATIC MOON SPUTNIK, splashed down in the designated area of the Indian Ocean on October 27, 1970. Launched on October 20, Zond-8 flew round the Moon carrying out its planned programme of scientific and technical research. Unlike the other Soviet automatic station Luna-16, which took a sample of Moon rock and then brought it back to Earth, Zond-8 did not land on the Moon. Nevertheless, both flights can be considered historical achievements — representing further advances towards the era of unmanned space expeditions which will involve no risk to human life

How Many of Us?

FIVE THOUSAND MILLION ANSWERS to questions were processed during the last census in the USSR. Census returns showed that the Soviet Union at

present has a population of 241,700,000, with over 100 nationalities represented.

Supreme Power in the USSR

THE NEWLY ELECTED SUPREME SOVIET OF THE USSR has 1,517 members: 767 in the Soviet of the Union and 750 in the Soviet of Nationalities. Altogether 153,172,213 people (98.96 per cent of the entire electorate), voted in the election.

Key to the Treasure House of Knowledge

THE TRADITIONAL STUDENT FESTIVITIES held in colleges and universities all over the Soviet Union to mark the beginning of the academic year vary considerably. At the Bauman Higher Technical School in Moscow, for instance, there is a solemn ceremony at which the rector presents new students with "the key to knowledge" and a symbolic students' card. One of the newcomers is accorded the honour of lighting an eternal flame in the "bowl of cognition" — a reminder that the future scientist or scholar is not a vessel which must be crammed with a motley complomeration of erudition but a torch that should be con-

stantly aglow with the inextinguishable flame of knowledge.

Off to the Shores of the Vikings

THE OCEAN FREIGHTER "NOPAL ARGUS" recently came off the stocks at the Black Sea Shipyards at Nikolayev (Ukraine). One of numerous ships built in the Soviet Union for export, she was ordered by Norway, a country renowned for its shipbuilding since ancient times.



Ancient Gold

FOUR THOUSAND GOLD ORNAMENTS dating to 400—500 BC have been found in the tomb of a wealthy soldier about 30 miles from Alma Ata, capital of the Kazakh Republic. The find was made by an expedition of the Institute of History of the Kazakh Republic during excavations of the big Issyk barrow. The ornaments are now on public display in the archaeological museum of the Kazakh Academy of Sciences.

Sir Bernard Lovell of Britain, a world authority on astronomy, called the new stage in Soviet space exploration a real revolution in the mastering of space.

LUNA-16



To the Moon and Back Without Risk to Life

For the first time in history an automatic station has landed on the Moon and returned to Earth with samples of lunar rock obtained with the aid of a drill.

On September 20, 1970, the Soviet automatic station Luna-16 made a soft landing on the Moon near the Sea of Fertility. An electric drill bored a 14-inch hole in the lunar surface, and a scooper device collected samples and placed them in a container in the return capsule. On September 24 it made a soft landing in the pre-arranged area, some 50 miles from Jezkazgan, in the Soviet Republic of Kazakhstan.

The chief designer of Luna-16 gave the following interview to Boris Konovalov of the newspaper *Izvestia*.

Tell us, please, were you satisfied with Luna-16's performance?

Everything went smoothly, without a hitch. We did not have a single complaint to make on the station's functioning at any stage of the flight.

Were there no moments when you were concerned for the fate of the station?

Fortunately no emergencies arose. But critical minutes occur in the flight of any new apparatus. The heart always beats a little faster during certain manoeuvres.

For instance, when orientation to the Sun or the Earth is carried out. The time assigned for this operation depends on the random initial position of the machine's axes. Should the station be turned slightly or by 180 degrees? Such corrections require different periods of time. It seems as though the Earth should long ago have been picked up by the station's optical orientation instruments but the signal is slow in coming. That happens almost every flight.

Naturally this flight caused anxiety because many things were being done for the first time in history.

When we realised that the station had already landed on the Moon, that a mechanism was descending to the lunar surface and beginning to drill a hole, our hearts stood still. At the com-

mand post a small model of the station stood on a desk in front of us. Looking at it we imagined how some unknown inhabitants of another planet might be watching that mysterious apparatus, which did not have a single living creature in it and on which, nevertheless, something was moving, turning, shifting.

Suddenly a report came that the temperature in the rocket's instrument section was dropping faster than expected. Of course, we were worried. The station was conducting the world's first moon probe at night — in extremely low temperatures.

The rest of the experiment, I would say, was uneventful. On the other hand, wouldn't you call the rocket's take-off from the Moon another critical moment? When the rocket did start on the way back, adults at the command post behaved like children — kissing and laughing... It was the first time an automatic rocket had launched itself from the Moon. And another eventful period was when the descent capsule was approaching the Earth.

From the moment the capsule enters the Earth's atmosphere, we lose contact with it. So you can imagine how tense it is until a report comes in that it is safe and sound. You feel quite helpless. If something goes wrong, if

the parachute fails to open, for example, there's simply nothing you can do about it. So people fret, and smoke, and pace back and forth. In the case of Luna-16, fortunately, it was only a matter of seconds.

Generally speaking, locating the capsule even in a limited area is a difficult task: it may fall into bushes or a crevice. It was a great relief to learn that a search party had spotted it practically as soon as its parachute opened. It was kept under observation throughout the whole descent and helicopters landed beside it. We were delighted with the accuracy. Again it was another first: a Moon-Earth flight effected without correction of trajectory!

What provided the greatest difficulty in the designing of the station?

There is nothing easy in our profession. Everything is difficult. But some elements of the job were really challenging. Above all, those to do with the mechanism that functioned on the Moon.

The station landed at night, when the temperature of the lunar surface was lower than 150 degrees below zero Fahrenheit and we had to ensure that all parts of the mechanism performed faultlessly at such a temperature.

At the same time, knowing that the mechanism would possibly have to work on the Moon in the daytime as well, we had to ensure the functioning of all its instruments at a temperature of 302 degrees above zero. Within the range of -228° to $+302^{\circ}$ we had to test all its mechanisms, which had to display a high degree of accuracy.

The manipulator, for instance, had to store the moon samples and hermetically seal the capsule. This meant it had to operate in the automatic mode, a margin of error not exceeding fractions of a millimetre. With such contrasting temperatures, it was no easy job.

Besides, the automatic device had to work in a vacuum which meant there was great danger of the moving parts sticking.

We had to put in a great deal of effort over the logic of the station's automats, the system of control and the system of orientation.

How were Luna-16's ground tests organised?

As one of our designers says, "we did it on the principle of technical teasing of the machine."

Joking aside, we really tried to create the harshest possible conditions for the ground tests in order to rule out unpleasant complications during flight. Se-

veral descent capsules had to be manufactured. We rotated them under immense stresses in a centrifuge; we mercilessly shook them on a vibration table; we dropped them from aboard planes at high and low altitudes over the sea, forests, mountains, fields and deserts.

Of course, the capsule did not withstand all the endurance tests at once. At the beginning, for instance, it failed to withstand the scorching flames of a powerful burner which simulated the thermal conditions of re-entry into the terrestrial atmosphere.

To endure such plasma-hot flames, its thermal insulation coat, ideally speaking, should have been made seamless. But, alas, that was impossible: first, the lid of the parachute section, which is cast aside to release the parachute, must be made detachable. Though it is fastened to the apparatus with very small clearances, still such clearances exist. Besides, there is the hole through which the rock has to be inserted into the capsule. Then the lid seals it hermetically. However, the surface irregularities remain, and it is dangerous. But every snag can be coped with if enough efforts are exerted.

Lunar conditions were simulated on special stands.

The power units passed the rig tests in the specified time limits

of real flight. Shortly after fuelling we simulated the launching. On the following day we effected the first correction. A day later, the second. And then, the braking.

We simulated the take-off from the Moon on both test stands and on computers.

To obtain positive results of all ground tests required an immense amount of effort.

What are the principal features that distinguish Luna-16 from its predecessors?

Luna-16's predecessors did not have to land in a given area of the Moon or start back. Luna-9 and Luna-13 flew to the Moon without orbiting it.

In principle, any automatic station can make such a landing. However, it is difficult to land in a set area. We were interested in an accurate lunar touchdown since the position of the station on the Moon to some extent predetermined the location of its landing on Earth.

For that reason we put Luna-16 on a lunar orbit, made two trajectory corrections of this orbit and effected the lunar landing with an accuracy of fractions of a kilometre.

Secondly, none of the previous stations had a sophisticated mechanism for selecting lunar rock samples or hermetic packing of

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these samples in the recovery capsule container.

To perform this task we needed a better system of astro-orientation. The machine as a whole became more complicated, so we had to make a power unit that could repeatedly switch on the engine. The logic of the station's automats became far more complex. We provided for different emergency situations in which the automats could find ways out and save the station.

What do you think should be the distribution of roles between man and the automatic devices in exploring the Moon?

I am a supporter of the automatic probes. They are cheaper and in principle can do what man can do: they bring back to Earth samples of lunar rock, make on-the-spot explorations, measure the Moon's temperature, radiation level and other parameters.

We highly appreciate the results of the United States' Apollo programme. However, as I see it, exploring the Moon with the help of automatic stations is more justified today. Of course, this is my personal viewpoint, but economic considerations are of importance in any estimate.

After it took off, Luna-16 left its "platform" behind in the Sea of Fertility and later we had several communication sessions

with it. That means that in principle one station can combine equipment for a detailed exploration of the Moon and for the delivery of some of the results of this exploration back to Earth. In the future we might be able to dig into the lunar crust much more deeply than 14 inches.

I can visualise the setting up of automatic observatories on the Moon.

Could you give your view of the further progress of astronautics?

In the exploration of the planets the most important role will certainly, at least in the foreseeable future, be played by automatic stations.

Take the flight to Venus. Could man withstand the conditions of that planet, with the pressure of its surface exceeding 100 atmospheres and the temperature being close to 930° Fahrenheit?

Or take Jupiter or Saturn. These planets will become accessible perhaps only to our grandsons. Even in the exploration of Mars, a planet relatively hospitable to man, automatic devices like Luna-16 will play, as I see it, the leading role. They can, for instance, provide an answer to that fascinating question: is there life on Mars?

In short, long live automatic space stations!



by Vladimir POLYAKOV

from the newspaper
VECHERNYAYA MOSKVA

Our Home

Today is a holiday in our home. Our block of flats is 60 years old. This age is young for a building, but nevertheless as it is a round figure the apartment dwellers are celebrating it.

First of all the building got a face lift. The doors and windows were painted, the windows washed and flowers were planted in the front yard. We even had a glass of champagne in honour of the occasion.

The ground floor of our building is occupied by a pharmacy, a bakery, a photography shop and a tailoring establishment.

The manager of the pharmacy is Yakov Matveyevich, who also lives in our building. He is infatuated with his pharmacy as if with a woman. Even on his days off he runs in to see how it is doing.

"Medicines are my soldiers," he says, "which I distribute through the city to do battle with illness. What do you understand about pharmacology? You probably think that castor oil is awful but in reality it is a beneficent being. And what about penicillin? Or belladonna? Or sulfa? These words ring like the sonnets of Petrarch!"

Nyura Boldina, who lives in the neighbouring flat to ours, works in the bakery. The loaves of bread twinkle in her hands like pins in the capable hands of a juggler.

"Citizens!" she says. "Buy bread and buns! Hurry! Fresh, aromatic bread!"

Mamashidze, another neighbour of ours, gives the orders in the

tailoring shop.

"Don't be upset," he tells a customer. "So your trousers are a little narrower. That doesn't mean they're worse. You'll look a little more up-to-date, that's all. What did you say? Small pockets? You have so much money you need bigger ones? To put your hands in your pockets? That's only done by badly brought up children. The jacket wrinkles? Don't you ever wrinkle your face? And it's not a man but a jacket. Don't worry, don't worry, we'll alter it..."

The customer is visibly upset and curses the tailor under his breath. But he still goes to him. Because even if Mamashidze does talk irrepressibly, he happens to be a good tailor.

Next door is the photography shop. It is a little younger than the building itself. At one time it did not command the respect of its customers. They would come for their picture and exclaim indignantly: "Just look at this photograph. It doesn't look at all like me!"

"Citizen," the manager would say soothingly, "we are not taking pictures for a likeness, but for a passport."

Today it has an excellent reputation. Judging by the display window, many eminent actors and singers have had their pictures taken here.

The block has been repaired and painted up, but if you look more carefully you will see the traces of wounds. The fascists



bombed it. They set fire to it and attempted to wipe it off the face of the earth. But it withstood the attacks. The inhabitants did not permit it to go up in flames. The building remembers those days and nights, remembers those who no longer live within its walls. And sometimes it weeps.

To this day a huge piece of a demolition bomb lies in the yard. It has not been taken away intentionally. It is like a memorial

to the courage and tenacity of the building. Around the metal, dahlias bloom like medals, and pensioners sit nearby on benches and recall the day the bomb exploded. The stones in the yard listen to the muted voices of the old people. The stones remember everything. They know that sometimes the people mix things up but they can be forgiven — after all, they are old.

Today it is sunny and the windows squint against the light. They witnessed the first days of the revolution when fleeing police ran across the roof of the building. They saw the queues for bread, the troops marching to the front — as many times as there have been frontlines. And then, over the roof, burst the ear-shattering artillery salute to victory. That was a day.

The inhabitants return home — scientists and doctors, turners and fitters, heroes of the war, students, accountants, clerks... They return home and the doors of the building are thrown wide open to greet them.

The doors understand everything. If Petrov returns home humming an unidentifiable snatch of melody, it means all is well at the plant. If Anna Vladimirovna walks slowly, whispering to herself, it means she has a new role in a play. If Sviridov walks fast, unseeing, he is turning over a mathematical problem in his mind.

The door also knows that when Nazymov returns home after one o'clock in the morning, Maria will

be waiting up for him and the door knows not only Who but What lies in store for Nazymov.

And the staircase? It, too, is quick with its guesswork. It determines the true style of affairs by the tread. The sharp tattoo of high heels, the shuffle of a sole, the confidence or lack of it in a walk all tell their story.

And in the late evenings the lamp lights wink slyly. To whom? To lovers of course. They and the caretaker are the first to know of budding romances, to be aware that Nina in flat No. 25 spends a considerable length of time standing in the entrance with Seryozha from 65A.

The old gates to the building (they should be pensioned off — listen to them creak) goodnaturedly put up with the children hanging on to the ironwork. As a matter of fact they are secretly proud of this role — the children are playing at the storming of the Winter Palace and the gates willingly open to the assault.

Night falls over the building, a peaceful, calm Moscow night. The lights in the flats go out one after

another and finally only a solitary gleam is left.

Behind the window sits a poet at his desk. He is as old as the building itself but his heart is young and he is writing poetry about his home. He is writing about a building that encompasses a whole world, about its wonderful inhabitants who came from heroic Odessa and legendary Leningrad, from Murmansk deep within the Arctic Circle, from Bratsk in Siberia, from sunny Erevan, from Sakhalin island and even from Paris and New York. He writes about this micro-world.

A moon hangs low over the building. It cannot read the poetry, but it feels it. The moon always responds to poets.

I love our building. I am proud that it shelters men and women who by their lives, their labours glorify this apartment block, our street, our city, our homeland.

Dear home! You are 60 years old. What can I give you for your birthday?

Let these brief words serve as my modest offering. They come from the heart.

NATURE'S OWN ZOO

The Maritime Territory in the Soviet Far East has a rich and varied animal life: 41.5 million acres of the Territory are inhabited by 465 species of animals and birds. Its rivers, lakes and coastal waters abound in fish. Scientists say the country has 100 fresh-water and 800 ocean varieties of fish.

From the newspaper KRASNOYE ZNAMYA

Insights Into Insomnia

*from the magazine
NAUKA I ZHIZN
(Science and Life)*

At the beginning of the century Pavlov came to the conclusion that sleep was inhibition — a slowing down designed to protect brain cells from overwork, exhaustion and death. With the invention of the electroencephalograph, new facts came to light which led scientists to do some rethinking on the question of sleep.

Dr. Pyotr Anokhin, a Member of the USSR Academy of Medical Sciences, Dr. Alexander Wein, Dr. Lev Latash and other Soviet scientists, upon analysing and summarising their observations, have come to the belief that sleep is an activity of the brain other than inhibition.

When we really know what sleep is scientists will be able to give recommendations for prevention and treatment of insomnia.

The following interview with Dr. Wein and Dr. Latash, leading Soviet neurophysiologists, may be of interest to at least one in four readers: for one-quarter of the world's population are insomniacs.

Question: What is the reason for insomnia?

Answer: First, let us define insomnia: it is not the disappearance, but a disturbance of sleep. Reports in the press that some individuals do not sleep at

all should not be taken seriously. As has been shown by prolonged investigations with encephalographic registration of the state of sleep, no human being can do without sleep altogether.

Of course, different people re-

quire different amounts of sleep in order to feel physically rested and to maintain their normal capacity for work: some sleep four or five hours, while others sleep between eight and ten hours a day. Peter the Great and Napoleon, for instance, never slept longer than five hours a day, while Edison managed with only two hours. All three, however, preserved a wonderful capacity for work.

Now about the reasons for insomnia. Quantitative and qualitative disturbances of sleep are invariably the result of illness, above all affecting the nervous system. A smaller proportion of insomniacs have experienced cranial or cerebral injuries, or both, or organic brain diseases such as encephalitis. In the main, however, insomnia is a complaint of neurotics.

Neuroses, that is, malfunctions of the nervous system, can be caused by prolonged conflicts, involved situations or various forms of excessive strain on the nervous system.

Many factors in modern society provoke neuroses, an unfortunate consequence of which is disturbed sleep. The slogan of the twentieth century seems to be: maximum information per unit of time. The result is information overload, which either causes or aggravates a neurotic condition.

Question: Why does insomnia most frequently affect those engaged in mental labour?

Answer: Information overload is a strain on this category particularly. If the mental worker is incapable of processing the whole mass of information he needs for his work he develops an inner conflict which produces nervous overstrain with all its consequences. A complicating factor is lack of exercise.

In our time, it must be added, automation is taking over jobs previously performed by physical labour. This means considerable mental strain and concentrated attention on the part of the worker. So, information overload coupled with muscular underload is becoming increasingly troublesome for this category, too.

Question: Do sleep disturbances depend on age?

Answer: Most insomniacs are elderly people. They have trouble falling asleep and frequently wake up in the middle of the night or before dawn. Nevertheless, elderly people make fewer complaints about undersleeping. It affects young and middle-aged people worst of all.

Question: What are the modern concepts of the cerebral mechanisms of sleep? Obviously, without understanding them, it is not possible to understand the reasons for sleep disturbances.

Answer: That's true. Before trying to find the scientific explanation of disturbed sleep and giving scientific recommendations for prevention and treatment of insomnia, one must know what is going on in the brain during

sleep and what is the purpose of this state, in which man spends one-third of his life. All the more so since in the past 15 or 20 years brain physiologists have obtained new facts of primary importance, which require rethinking on the state of sleep, as well as on a whole series of general propositions concerning the activity of the brain.

The main conclusions reached by sleep physiologists are as follows. In its essence or physiological mechanisms, sleep is not a uniform condition but is made up of at least two phases: sleep without dreams ("slow" or "orthodox" sleep) which produces slow waves on the electro-encephalograms, and sleep with dreams ("fast" or "paradoxical" sleep) in which case the electro-encephalograms reflect a state close to waking. Fast sleep is accompanied by quick movements of the eyeballs, sharply depressed muscular tone and dreams. It is, so to say, waking turned inwards.

During the night fast and slow sleep form cycles alternating four or five times a night. Every cycle begins with a phase of slow sleep which leaps into a phase of fast sleep. Fast sleep sets in 60 or 90 minutes after man falls asleep and its consecutive periods grow longer toward morning. Altogether, fast sleep accounts for some 20 per cent of the night's sleep.

The two phases of sleep differ sharply in their manifestations, mechanisms of emergence and

sensitivity to different medicinal preparations.

Question: Is it true that sleep is an inhibited condition of the brain cells and that insomnia is caused by the stimulation of the brain's nerve cells?

Answer: Facts obtained in recent years disprove the hitherto widespread view that sleep is a state of inhibition spreading to vast numbers of neurons or at least a quantitative prevalence of inhibited neurons over stimulated ones. Sleep appears to be a specific activity of the brain, the significance of which, so far, remains largely unclear.

It has been suggested that the onset of sleep has something to do with the limit of the brain's information capacity, the so-called short-term memory. While man is asleep the information stored during the day apparently undergoes distribution: one part of it goes into long-term memory, another into the current activity programme, and what is useless goes out. But so far this is only a hypothesis.

Question: Can sleep cure illnesses or complaints?

Answer: At one time scientists really thought that sleep had curative effects and could be used as a method of treatment for nearly all diseases. This hypothesis stemmed from the idea of sleep as a form of protective inhibition, but this has been disproved by many newly obtained facts.

What then explains the beneficial "unloading" effect of sleep, which removes emotional stress in difficult cases?

To date there is no final answer to this question, as the purposes of the processes taking place in the brain during sleep remain unknown. It may be assumed, however, that a major role in this effect of sleep is played by further processing and distribution of the day's information.

Question: What is the mechanism of night sleep in insomniacs?

Answer: Thorough encephalographic research reveals that insomnia may be caused by different changes in the structure of night sleep. Sometimes its cycles do not have the deep phase of slow sleep, sometimes there is a prevalence of fast sleep with dreams and frequent awakenings. Finally, the overall duration of sleep, or only the phase of fast sleep, may be reduced.

Multiple investigations of night sleep have led us to the conclusion that even those who complain about only two or three hours' night sleep, in fact sleep five or six hours. And, it must be remembered, in unfavourable circumstances at that, with electrodes attached to their bodies!

Question: Which is better for the health: sleep with dreams or without?

Answer: Everyone has dreams but not everyone remembers

them. Dreams are a distinctive form of periodic psychic activity, which is vital to the normal functioning of the brain. If man is deprived of fast sleep with its dreams, he will develop mental disturbances. There are many instances to prove this.

Question: Are regular hours of sleep important and at what times is it best to go to bed and rise?

Answer: Sleep distribution obeys the inner rhythms of the organism, which are related to its many individual properties. A close study of these properties has led to dividing mankind into "skylarks" and "owls". The "skylarks" are early risers and work well in the morning and before dark. The "owls" go to bed late and wake up late and work best in late hours, too.

So no one can say when it is best to go to sleep and get up.

But the study of individual peculiarities of sleep may reveal interesting possibilities. Since the peaks of working capacity of "skylarks" and "owls" are different, perhaps it would be good for these two categories to work and study at different hours?

Timing working hours to coincide with peak work capacity might well offer major economic benefits.

Question: What are the commonly practised methods of treatment for insomnia?

Answer: It is not insomnia but the source disease, normally the neurosis, that needs treatment.

Incidentally, insomniacs ex-

cessarily believe that sleep must necessarily last a long time. That gives them a fear of undersleeping and sleepless nights. This fear, aggravating their tense condition, in itself prevents them falling asleep and sometimes causes persistent sleep disturbances.

The most justified method of treatment in such cases is psychotherapy, which takes different forms. Neuroses call for comprehensive treatment. Psychotherapy alone is not enough.

Question: How do you look upon sleeping pills?

Answer: On the whole, positively. But we believe that the doctor's usual examination is not enough. Thorough electrophysiological investigation of night sleep in order to discover structural defects is also required.

Regrettably, doctors so far have no sedatives at their disposal that can control different phases of sleep. They all ease the process of falling asleep but suppress the phase of fast sleep, which, we repeat, is necessary to keep the brain working normally.

Taken once, this side-effect is negligible. Taken regularly, sedatives at first suppress the phase of fast sleep. Then the brain gradually adapts and the phase of fast sleep is restored to the needed proportions.

If the user, for fear of developing a habit, cuts them out, his brain begins to develop excessive amounts of fast sleep. This aggravates his condition, intensifies the sensation of insomnia and some-

times — still worse — produces nightmares. Fast sleep takes some four to six weeks to get back to normal. The sufferer must wait patiently. However, if exhausted by several sleepless nights, he again takes the sedative and feels unable to do without it, then he becomes a sleeping pill addict.

But worst of all, some people resort to sedatives frequently but irregularly — at intervals of two or three days. In this case the brain only begins to adapt itself to the adverse aspect which prevents fast sleep, when the interval rapidly intensifies fast sleep. The result is constant wearying dreams and an acute feeling of sleeplessness.

That is why we categorically object to self-treatment: only a doctor should prescribe sleeping pills and dosage.

But the best thing to do is, without turning to the doctor for assistance, to try to regain the ability to sleep long and profoundly in natural ways. A beneficial effect is exercised by physical work outdoors, sports and hiking trips. Sometimes it is enough to settle down to a strict daily routine that includes a frugal supper, a walk and a warm shower before bedtime, and sleeping in a well-aired room.

Question: Many doctors recommend autosuggestion to insomniacs. Does it help to normalise sleep?

Answer: It certainly does. Many people develop what is known as sleep rituals: reading

and a definite position of the body when falling asleep. Firmly established, these rituals become positive factors and constitute a form of auto-psychotherapy, that is, autosuggestion, which does a lot of good to the patient. However, there is no point in developing such habits artificially.

Another form of this method,

as we see it, is also most productive and consists in controlling muscular tension, respiration frequency, heart contractions and temperature of the skin. In a word, what we mean is autogenous exercises that help remove inner tension, which, more often than not, causes prolonged, agonised expectation of the onset of sleep.

THE NECESSARY THIRD

Doctors maintain that sleeping flat on your back, on a low pillow, is the best of all positions. It enables the blood to circulate freely and for sufferers from migraine headaches is especially recommended because the flow of blood to the brain is eased. In the morning the sleeper will awaken refreshed and with a clear head.

However, if you are fatigued from physical work, it is better to sleep on the left side. Studies have shown that usually it is the right side of the body that is over-strained and in this position those muscles most affected will find greatest relief.

If suffering from indigestion, sleep flat on your belly. Also good for those insedentary occupations and whose abdominal muscles are flabby. The weight of the body exercises a beneficial, mechanical effect on the bowels.

If your liver bothers you, sleep on your right side. You will keep it warm, the ligaments will be more relaxed and the gall overflow will improve.

From the weekly NEDELYA

Chessmen from a Death Camp

by Kim **BOLDOKHONOV**
from the newspaper **MOSKOVSKY**
KOMSONOLETS

On a small desk in the Lenin Museum in Ulan Bator, the capital of Mongolia, I saw what looked like an ordinary chessman. Under the glass top there were photographs of Mauthausen inmates: emaciated old men, women and children. On a strip of paper the number P-65937 was written in Indian ink.

Having caught a look of perplexity on our faces, the museum guide switched on the desk lamp. Suddenly, the chessman seemed to come to life: on a white sheet of paper which served as a backdrop the familiar silhouette of Lenin appeared.

The extraordinary history of this unusual exhibit was told us by the director of the museum.

Among the prisoners of Mauthausen there was a taciturn old man whom all the inhabitants of his barrack building simply called "grand-dad". The man suffered from insomnia and when his fellow-inmates woke up in the morning they would find him in the same posture — sitting hunched over a piece of wood which he was fashioning with a penknife.

Asked what he was doing, the man, knitting his bushy eyebrows, would say: "Nothing, just carving a thing or two". But the knife in the big,

capable hands kept on chipping at the wood.

Many days passed. One early spring morning the craftsman disclosed his secret. On the table he placed several wooden chessmen. The rays of the rising sun which stole in through the small window lit up the pieces, and the familiar outlines of Lenin appeared on the barrack wall. "Today, my friends, Vladimir Ilyich Lenin would be 73 years old," the old man said thoughtfully.

He gave his wonderful little carvings as present to his fellow-prisoners. From then on, every morning the image of Lenin appeared on the barrack walls. When camp guards came in the inmates mixed the pieces with chessmen so there was no telling them apart. The image of Lenin inspired the men and fed their faith in the long-awaited liberation.

Alas, the old man failed to live to see victory. The jailers got wind of the "magic chessmen", ransacked all the barracks and found the "sedition". The man was tortured to death. But in spite of everything, someone managed to hide and preserve some of the precious pieces for posterity.

This chessman, concluded the director, is a present to our museum from a Soviet doctor, Vassili Denisenko from the city of Chernovitz, who was a former prisoner of Mauthausen. He worked in Mongolia for several years.

Regrettably, the old carver's name remains unknown. Only his camp number, P-65937, has survived.

This unusual exhibit is always surrounded by crowds of visitors. I saw Mongolian schoolchildren examine it with keen interest and listen with rapt attention to the guide's stirring account.

The Roads We Build...

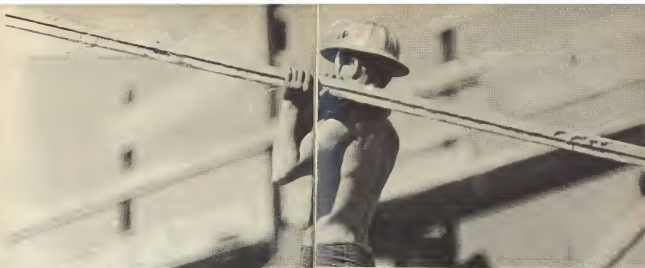
Twelve years ago, a group of students from the physics faculty of Moscow University took their summer holidays in Kazakhstan, in the virgin lands region. The main concern of the early settlers in those parts was grain. The summer season is short and they simply had no time to build clubs, bath-houses, or even schools. In winter in northern Kazakhstan it is impossible to undertake construction because of frequent snowstorms and intense cold spells. Learning all this, the students decided to do something practical for the grain-growers in the virgin lands. In preparation, back in Moscow in their winter evenings, they learned how to erect walls and



put on roofs and by the time they set off for Kazakhstan they were quite able to construct simple buildings.

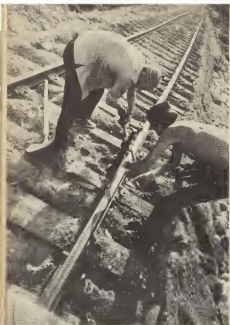
That is how student construction teams began. Today tens of thousands of junior students sign up for the project. The teams learn to function independently, demand iron discipline and carefully winnow the applicants. However, if a young person is accepted, he or she has a glorious opportunity to do something useful for society even in student days and to earn additional money.

The activities of these construction teams have since spread far beyond the borders of Kazakhstan. In the months of July



and August, teams can be encountered in various parts of the country — building dwellings and roads, laying electric, gas and water lines. Contacts with the local population are broad: lectures, concerts, sports competitions are organized. In these pictures, students from the Moscow Transport Institute team are shown. In the north, in the forest and marsh lands of the Arkhangelsk region, they are helping to build a railway.

Hard work has never yet done anyone harm. What pleasure: at the end of a day to wash off the sweat and dirt of the job, to



change into fresh clothes, sit down by a camp-fire and read a letter from home. A popular song among the members of this team goes: "Do not wish me a peaceful life, wish me a hundred roads..." The students, of course, don't have railroads in mind.



Academician

KOROLEV

The Life and Work of the Chief
Designer of Soviet Spaceships
by Pyotr Astashenkov

His is an ordinary and at the same time an outstanding biography. In the memorable days when the first steps were taken into outer space he was known here as the Chief Designer.

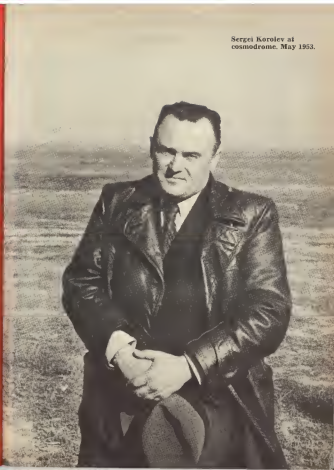
Sergei Pavlovich Korolev dedicated his whole life to the development of rocketry. October 4, 1957, is written in gold letters in the history of mankind. That was the day the space rocket system designed by Korolev and his team placed Sputnik, the first artificial earth satellite, into terrestrial orbit.

Then followed test flights of spaceships and later automatic interplanetary stations. A pennant with the Soviet national emblem was sent to the moon. A spacecraft circled around the moon and photographed the reverse side; spaceships were designed and built to take man into the cosmos and back to earth. Man could now leave his flying ship and walk in space.

On April 12, 1961, the world's first spaceship, Vostok, with a man on board, made a flight around the earth and a safe landing on Soviet territory. The ship was piloted by cosmonaut Yuri Gagarin. In 1963 cosmonaut Alexei Leonov walked out of the spaceship Voskhod-2 into the open cosmos and floated through the void.

The life and creative work of this outstanding designer is the subject of a book by Pyotr Astashenkov, a condensed version of which follows.

Sergei Korolev at
cosmodrome. May 1953.



Beginning of the Biography

In the Ukrainian city of Zhitomir, there stands a one-storey house surrounded by birch trees. Here, on January 12, 1907, a boy, Sergei, was born to a teacher of the local grammar school, Pavel Yakovlevich Korolev.

Seryozha (Sergei) was only two years old when his parents divorced. He never saw his father afterwards and naturally could not remember him. His mother, Maria Nikolaievna Moskalenko, took the boy to her parents and herself went to Kiev where she studied to become a French language teacher.

In 1916 Maria Nikolaievna married an engineer, Grigori Mikhailovich Balanin. He was a kind man and soon became a close friend to the boy. The same year the family moved to Odessa. At seventeen Seryozha entered a technical school. He was a good student in all subjects but his favourites were mathematics, physics and physical culture.

A short distance away from the place where the Balanins lived at the time, pilots were stationed who did summer practice flying amphibious planes. Sergei spent hours watching the large, clumsy machines take off, rise and disappear in the sky. The boy soon scraped acquaintance with the fliers, who on several occasions even took him up for a ride.

In June 1923, Korolev joined a gliding club and learned to fly one. A year later he designed a

glider which was accepted for construction.

The question that bothered the young Sergei was where to continue his education. Finally he decided to enrol at the Aero-mechanical Department of the Polytechnical Institute in Kiev. He studied, designed gliders, did a lot of flying and, since he now lived alone, took a turn at various jobs — stevedore, newsboy and an extra at the film studios.

In 1926 Sergei transferred to the Higher Technical School (MVTU) in Moscow because aviation engineers were no longer trained in Kiev. The new college was exactly what Korolev wanted as it was here that the outstanding aviation theoretician, Professor Nikolai Zhukovsky, had once taught. And now the faculty included some of his brilliant pupils — Chaplygin, Vetchinkin, Golubev and Tupolev.

In the autumn of 1927, Korolev took part in the All-Union Rally of Glider Pilots at Koktebel. There in the Crimea (in the south of Russia) he met Sergei Liusbin, who became one of his closest friends. Two years later they designed and built a glider called "Koktebel". The glider was first tested in the Crimea and proved an excellent craft.

Here is how Sergei Pavlovich described his first flight in his own glider in a letter to his mother:

"At last I made a solo flight in my glider. Everything went better than I expected. For the first time in my life I experienced

an incomparable feeling of fulfillment. I felt like shouting to the wind that was caressing my face and whose gentle gusts were rocking my beautiful bird.

"I somehow could not believe that such a heavy piece of metal and wood could fly. But as soon as I took off I could feel my machine come alive, flying though the rushing air and responding to every movement of the stick.

"Could there be any greater reward than to be able to fly your own plane? For this moment one can easily forget the sleepless nights, the days spent in hard work, without rest or respite..."

The First Liquid Fuel Rockets

In July 1930 Korolev was appointed senior engineer at the Central Aerohydrodynamic Institute (TSAGI). On the surface his work fully corresponded to the duties of an ordinary aviation engineer. But in actual fact he was more and more veering off into the newly-born science of rocketry, in which interest had been aroused many years earlier by the works of Konstantin Tsiolkovsky, the father of astronautics.

A few months before, experiments in using gunpowder for flying machines had been carried out abroad — in Germany (1930) and Italy (1931). At the same time Vladimir Dudakov of the Gas Dynamic Laboratory (GDL) in Leningrad, tested gunpowder boosters mounted on a heavy bomber, TB-1. The switching on

of rockets at the start shortened the length of the take-off run and made it possible to increase the flying weight of the machine by two tons.

On learning about the GDL experiments, Korolev, in the summer of 1932, visited the Commandant Airport in Leningrad, examined the rocket boosters and made a flight aboard the TB-1 using the rocket booster. At the same time GDL was also working on liquid fuel boosters. Two of them had already been tested. Korolev then decided to install a liquid jet propulsion "heart" in a flying machine.

On August 18, 1931, a special group for the study of jet propulsion (GIRD) was set up.

One of GIRD's teams was supervised by Korolev personally. Its job was to design winged jet flying machines. It was this team that modified the glider designed by Cheranovsky for carrying a jet engine.

In a letter to Konstantin Tsiolkovsky, a GIRD secretary wrote: "Our experimental work on the jet plane GIRD-RP-1 is drawing to a close... We have many skilled engineers here, but by far the best of all is the chairman of our Technical Council, engineer Sergei Korolev... It is he who will pilot the first jet plane."

* * *

In the autumn of 1933 the world's first Jet Propulsion Research Institute (RNII) was

established on the basis of the staff of GIRD and GDL. On November 9, 1933, Korolev was appointed deputy director of the Institute.

RNII gave birth to a whole series of winged rockets.

Korolev and his assistants built these rockets with a designed range of 50 kilometres, in 1936. The rocket was tested thirteen times at an ordinary proving ground.

The other two winged rockets were designated "201" and "217". In modern military parlance the "201" rocket could be classed an air-to-ground missile, and the "217" rocket an anti-aircraft missile with a locked-on beam guidance device.

In 1935 it was suggested that the RNII suspend work on wingless rockets. The proposal was discussed by the authorities and staff of the institute but was vehemently opposed by Korolev who went on record with the following statement:

"It is essential to continue the research in wingless rockets for it would be an inexcusable mistake to back out in the face of minor technical failures. The entire history of world technology speaks to the contrary."

And it is the wingless rockets that have become the most powerful vehicle for space exploration.

Rocket Plane in Flight

Korolev never stopped thinking about building a rocket plane. He

presented a detailed plan in a speech at the First All-Union Conference which reviewed the possibilities of rockets for probing the stratosphere. That was in 1935.

In his words, a rocket plane was to be a free flying monoplane complete with fuselage and tail assembly.

He then dwelt on the main stages of its construction. First it was necessary to build a powerful engine operating on liquid fuel. Then came the construction of a large airtight cockpit, which was a difficult problem. And the third stage was the construction and exploitation of this huge high-altitude apparatus and a difficult work with a great mass of liquid gases.

" * * *

In July 1936, the Technical Council of RNII examined a sketch of the new rocket plane and okayed a short-term programme of work. To begin with it was decided to build a rocket plane laboratory RP-318. Glider SK-9 designed by Korolev was the first Soviet flying machine to receive a "rocket heart".

February 28, 1940, saw the first free flight of a jet-propelled glider in the Soviet Union. It was towed up to a height of 2,600 metres and then the glider was unhitched and began its independent flight.

The pilots who were observing the experiment left this record of the event:

"When pilot Fyodorov switched on the engine we saw a little cloud of smoke from the ignition pellet. Then came flames from the nozzle of the starter which left a trail of light grey smoke. Soon after the flames from the nozzle disappeared and we saw a tongue of flame about five feet long that was spurting from the engine proper operating on propulsion fuel. The smoke trail that was of the same colour dissolved almost immediately, which meant that the fuel burned up completely.

"After that the glider increased its speed, gained altitude and left us behind. All efforts to continue our observation failed. In spite of our attempts to keep up with the jet, we could not."

That was another great event in the history of Soviet and world aviation.

" * * *

The last war was like a gigantic proving ground on which, in difficult combat conditions, new types of weapons were tested. The Soviet jet installations with solid fuel missiles, the famous "Katyushas" proved to be a formidable weapon.

During the war the Soviet Union did not use liquid fuel rockets as combat weapons. However, our scientists continued to work on them despite the wartime difficulties. Finally, on May 15, 1942, a fighter plane, BI-1, with a liquid fuel jet engine, appeared in the sky over the Ural



Seryozha Korolev at the age of two. Zhitomir, 1909.

Mountains. Engines of this type were also used as boosters for combat aircraft.

During the war Sergei Korolev worked on jet boosters for aircraft. In August, 1944, he tested liquid fuel jet engines that were to sharply increase the speed of combat aircraft at the most crucial moment of air combat.

The experiments made in testing aviation boosters were of great significance for their further development when they finally became the chief take-off device used in planes and rockets.

Ballistic Missiles Off to a Good Start

The Central Committee of the Soviet Communist Party and the Soviet Government appreciated the tremendous significance of rockets for the progress of science and for the defence of our country.

Soviet scientists began work on building powerful ballistic missiles.

Korolev was appointed chief designer of one of the departments of the Institute, on August 9, 1946.

He, like other Soviet rocket scientists, was well acquainted with the German liquid fuel combat rockets of the war days. He found nothing new in them, as they were all largely based on Tsiolkovsky's ideas. Our scientists were to work out designing powerful rockets, to establish a new branch of science and technology, with independent production facilities.

* * *

In the autumn of 1947, Korolev went to the proving ground to supervise the testing of the first long-range liquid fuel rockets designed by his team. In letters to his wife, Nina Ivanovna and in entries in his diary, he wrote:

"Terrible dust. Heat in the daytime, cold at night. Shortage of water. And all around nothing but dreary steppe. Our mobile shelter is like an oasis in the desert. But we are rarely here.

"I am feeling fine, and in good

health. Lots of work. My schedule is roughly this: I get up at 4.30 a.m. Moscow time, have a quick breakfast and then set off to the field. Sometimes we return in the daytime, sometimes in the evening. But then as a rule, an endless number of questions arise and I seldom get to bed before one or two in the morning.

"Our work presents an abundance of difficulties which so far we have been able to handle. It is gratifying to find that our young team has turned out to be exceptionally closely knit and on good terms with each other. In these conditions it would probably be impossible to work here otherwise.

"Very often I find it hard going, I do a lot of thinking and rethinking. The trouble is there is no one I can go to with my problems. In spite of everything I am in high spirits, for I have faith in our work, knowledge and our lucky star.

"Write to me as often as you can, don't wait for letters, because hard days lie ahead. Soon we will be having a really busy time of it."

The "busy time" began on October 17. Within a few days eleven ballistic missiles were fired. This was just a beginning but a very promising one.

Korolev's design bureau, in cooperation with other groups, built a second version of his rocket, with an effective range twice as long as before. Then, after several years of hard work, a third version was built. This

missile could fly 1,000 kilometres — a real breakthrough!

Korolev and his colleagues also worked in close contact with the team of atomic scientists headed by Igor Kurchatov. As a result of this cooperation they combined a rocket with a nuclear warhead. Thus the world's first nuclear-rocket weapon was produced.

Korolev, like other Soviet scientists and designers, saw other uses for the powerful rockets. Rockets could serve science, for they could aid in studies of the upper layers of the atmosphere and the supra-atmospheric regions. For the first time in history man could send aloft sophisticated research instruments and experimental animals — send them up and bring them back to earth. And, just as important, the Soviet rockets could fly to an altitude never before reached.

Korolev's services were duly acknowledged. In 1953 he was elected a corresponding member of the USSR Academy of Sciences. In the same year he joined the Communist Party of the Soviet Union.

Sergei Pavlovich Korolev was a family man. On April 5, 1953, he wrote from the proving ground to his daughter Natasha:

"In a few days you will come of age, and can by right call yourself an adult. I wholeheartedly greet you on this occasion may you be a worthy citizen of our great Soviet Motherland.

"In spite of the hard times which we all went through in

past years, our Motherland never for a moment stopped showing great concern for you. Difficult as those days were, you grew up and studied and enjoyed life.

"Always remember this and always love our people and the land that raised you.

"I wish you joy and success in your work and studies, as well as happiness in your personal life. I have never doubted that you will be successful in both studies and work. You have chosen a noble path in life, and I am sure you will be equal to your choice.

"Your personal life is largely in your hands — you will meet many good people in this world. You will have great love and friendship, all this you will surely have! ... I love you greatly. I am now far away from you, but on April 10 you must know that I will think of you in this desert.

"Don't forget your father who loves you dearly, who always remembers you and will never forget you.

I embrace and kiss you
Your friend for life
Sergei."

From 1953 on Korolev threw himself into work on super-powerful inter-continental rockets. Such a rocket could blaze a path into outer space. The task was a truly stupendous one.

In one of his letters Korolev wrote:

* Natasha was a medical student.

THE KOROLEV MUSEUM IN ZHITOMIR

A memorial plaque was recently unveiled on an old one-storey house in Zhitomir (the Ukraine). It reads: "Sergei Pavlovich Korolev, an outstanding scientist, academician, rocket designer, twice Hero of Socialist Labour, was born in this house on December 30, 1906."^{*}

The decor of those days was reconstructed from the stories and pictures of his mother, Maria Nikolayevna — the walls are covered with paper the colour of light bronze; a graceful table stands in the middle of the room under a paraffin lamp with a glass shade.

The main hall of the museum displays numerous photographs and photostats of documents reflecting various periods of Korolev's life, his talent and audacity as a designer and researcher, his wonderful personality.

In order to garner such a mass of material, tremendous enthusiasm and hard work on

* December 30 is the date according to the old Julian calendar. After the Socialist Revolution, the Gregorian calendar was adopted, which moved all dates two weeks ahead. Accordingly, S.P. Korolev's birthday then fell on January 12.



House in Zhitomir where the future head of Soviet space programmes was born on January 12, 1907.

the part of the organisers was required.

The 400-odd items on display include models of the gliders, aeroplanes, rockets, sputniks and lunnicks and spacecraft designed by Korolev.

The museum also contains many of his personal belongings, among them candlesticks made at the time he was a student at the Kiev Polytechnical Institute, models of the moon made after the flight of the "Luna" automatic space station and the book by the Polish writer Stanislaw Lem which Sergei Pavlovich was reading shortly before his death. The collection also includes books with autographs and inscriptions made by cosmonauts who donated them to the museum.

"Many organisations and research institutes, practically in all parts of the Soviet land, have been drawn into our work. Many opinions, many experiments, many different results — all this is bound to produce one correct solution. That is why so much physical strength and nervous energy goes into the job."

To reach the "correct solution", as Korolev put it, he turned to the collective mind of his colleagues and to the works of Konstantin Tsiolkovsky.

In August 1957, the Soviet News Agency TASS released a statement on the building and testing in the Soviet Union of an intercontinental multi-stage ballistic missile. No other country in the world yet had a strategic rocket of this type.

Korolev never neglected research rockets. Under his guidance many such rockets were modified to fill the needs of science. To meet the basic requirement of "little space for many instruments" he spent hours doing complicated calculations and solving one technical problem after another. These rockets were called "academic missiles". Korolev decided to use them for sending animals to an altitude of about 100 kilometres.

This is no problem today, which shows how fast space rocketry is developing. In those days, however, many scientists were doubtful if dogs (the animals chosen for the experiment) would be able to endure such a flight.

On the other hand, Korolev had many fervent supporters of his idea, among them Academician Anatolij Blagonravov. A rocket was fitted with a capsule that contained two dogs. The experiment came off brilliantly. Despite the overloading from acceleration, the capsule landed safely, with dogs alive and well. All other similar flights with animals for passengers were equally successful.

Then Korolev suggested the second stage of this daring experiment — to make it possible to recover the dogs in an emergency situation. This, he said, was very important for future manned flights. So when the rocket reached a certain altitude, a special pyro-fuse was set off that jettisoned the dog from the capsule. Several seconds later a parachute opened and the dog gently floated to earth.

As work continued, the rockets were shot to still greater altitudes. This enabled scientists to measure the atmospheric density and study space radiation and the ionosphere.

In 1956 Korolev was awarded the title of Hero of Socialist Labour. In 1957 he was elected a full member of the USSR Academy of Sciences.

The First Orbit in Sight

When asked by a reporter how the idea of the first sputnik was born, Korolev replied:

"I took up rocketry with a vision of flight into outer space,



Korolev in his student years. He began higher studies in the aeromechanical section of the Kiev Polytechnical Institute. In 1925 he transferred to Moscow's Higher Technical School.



Among his friends and colleagues in the jet-propulsion study group, Korolev quickly acquired great authority, both as a talented scientist and engineer, and as an able organizer and leader.



1933. Before a rocket launching. Korolev standing at far left.

The young engineer Korolev designed this early rocket-powered glider.



Designer and pilot (Moscow, 1931). Korolev at the controls was as self-assured as at his draughting board or in the laboratory.



The testing site Nakhabino, near Moscow. The launching of a liquid fuel rocket.



of the launching of a sputnik. For a long time, though, the possibilities were non-existent. I could only dream about it. But now that powerful ballistic rockets had been created, this cherished goal was drawing nearer and nearer. We closely followed reports on the building in the United States of an artificial earth satellite with the suggestive name of "Vanguard". At the time some people believed that this satellite would be the first in outer space.

"We took stock of what we had, and decided that we could send a good hundred kilogrammes into orbit. So we sent our conclusions to the Central Committee of the Soviet Communist Party. There we were told that the idea was attractive but needed more thought.

"In the summer of 1957 the Central Committee of the CPSU finally endorsed the project.

"That is how sputnik was born. It went into orbit on schedule."

The rocket carrier was built and the calculations for the first orbital flight were made — all under the guidance of Sergei Pavlovich Korolev. He suggested that the design of the first sputnik be as simple as possible. Thus the sputnik itself was called PS, the Russian abbreviation of "simple sputnik". In professional jargon it is often referred to as "pee-ess" for the sake of convenience.

After much discussion it was decided that the first artificial earth satellite should be a ball 58 cm. in diameter, weighing

83.6 kg; stretching at a tangent off the ball were four antennae, two for each radio transmitter. The batteries were to last three weeks.

The assembly of the sputnik began in August. Korolev often went to the assembly shops, probed into every detail of the process, gave advice and assistance.

At the Design Bureau Korolev was often referred to as SP (pronounced Esspee), the initials of his name and patronymic. One could often hear "Esspee said," "Esspee thinks". Once the following incident happened. When the first sputnik was ready, one of the designers reported to Korolev:

"We shall soon launch Esspee into orbit. Esspee is already in the hangar. Now we are prepared to assemble a second Esspee."

Korolev could contain himself no longer and said:

"Esspee is me. And the satellite is pee-ess. All the rest is quite correct."

An engineer responsible for the preparation of the first sputnik reminisces: "I loved to... just stand and watch Korolev. He would come late in the evening to the shop where the huge body of the rocket was resting on the stocks, would dismiss the engineers and designers accompanying him, then he would sit down and fall silent. His face would be thoughtful. And then he would suddenly raise his head, as if shaking off the thoughts and get up. His face would change. It would be quite different from what it had been

a minute before. He would briskly fire a whole cascade of instructions. All you had to do was catch them!"

* * *

Early in September 1957, a group of experts from the Design Bureau, headed by Korolev went to the cosmodrome at Baikonur.

In a spacious conference room, scientists gathered and discussed details of the coming experiments.

After the meetings Korolev remained in his small study, with telephones on the left and the selector next to his desk on the right. Sitting there he could contact the entire huge operation of the cosmodrome.

The rocket carrier, because of its impressive size, occupied a vast assembly room. The moment came when the silvery ball was raised to the front part of the service module. The sputnik looked like a tiny toy compared to the carrier. It was attached to the rocket and the whisker-like antennae stretched down the nose of the rocket.

Korolev gave the order to switch on the instruments for a final test. The ball was plunged into silence and the magic beep-beep-beep sound filled the earphones of designers, engineers and mechanics. All was well on earth, but how would it be up in space?

The gate of the assembly room opened and a prime mover slowly pulled out the rocket of fantastic shape tipped with a shining ball. "Bon voyage," said Korolev.

"Let's go to see off our firstborn".

His words sounded sad, somehow, as if he were saying goodbye to a close friend.

At last the rocket was installed on the launching pad. On October 4, at 5.45 p.m. fuelling began.

Half an hour before the launching, people began to leave the site. Korolev was silent and seemed lost in thought. What was he thinking about? Perhaps he was going over the events of the past few days, imagining possible results and consequences of the launch for the future? At last he went to his bunker.

Fifteen minutes before the launching the order was given to lower the trusses. From that moment on everybody's eyes were fixed on the rocket.

Score of loudspeakers announced the first launching command. All the cables were disconnected and removed from the pad to a safe place. Now all the instruments on board the rocket were functioning with autonomous controls.

A few seconds later the final order was given — "Fire!"

When it was confirmed that the sputnik had indeed been put into orbit there was a loud "hurrah".

"At the time of the launching of the first sputnik I was in the United States," says Academician Blagonravov. "I was literally showered with questions: how could it be that the Soviet Union had outstripped the United States? So you were not bluffing

when you said the Soviet Union had an intercontinental ballistic missile? Are you sure it wasn't a misprint when your press put the weight of your sputnik at 83 kilogrammes? How could it be, since our own first satellite will weigh only a few pounds?"

"I did what I could to dispel the delusions of our American colleagues. No, there were no misprints in our press. The second sputnik which was under construction would weigh half a ton..."

When Korolev returned to the Design Bureau he familiarised himself with foreign press reports on the first sputnik. "It seems that there are dichards not only in politics but also in technology," he joked in clear reference to foreign specialists who persisted in saying that the Soviet Union lagged far behind the United States in the field of intercontinental ballistic rockets.

Practical Steps in Cosmonautics

The successful flight of the first sputnik enabled Korolev to make some adjustments in his earlier plans. For example, it had been thought previously that a living animal could be put into orbit only after two more successful flights. Now Korolev decided not to delay the launching of an animal — or, as he put it, to take it out of the third project and combine its capsule with the "simple sputnik" (PS). That was

Continued on p. 149

Road To The Stars

SPUTNIK, a magazine whose name is associated with the world's first artificial earth satellite, invites its readers to look into **SPACE**. Before you are colour pictures taken at the pavilion **COSMOS** at the **USSR Economic Exhibition** in **Moscow**. These are only a selection of those exhibits that are concerned with the name of **Sergei Korolev**. **SPUTNIK** hopes that they will help the reader grasp the main stages in the conquest of space begun by the Soviet Union, at the time when Korolev was directly involved in Soviet space programmes.

On the 15th of May, 1958, the Soviet Union's third artificial earth satellite became the world's first automatic, orbital scientific laboratory. The rocket which hoisted it let the world know that man's first venture into space was at hand. The rocket lifted 1,327 kilogrammes — a load 290 times heavier than that carried by the first Soviet rocket, launched in 1932.





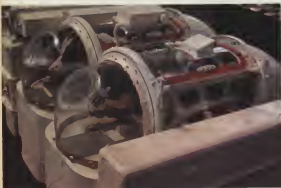
The world's first artificial earth satellite. It was launched on October 4, 1957. That day the Space Age began.



The space vehicles launched in 1960 and 1961, with animals and a puppet aboard, blazed the path for man.



The Vostok spaceship is the type of three-stage rocket which carried Yuri Gagarin, cosmonaut number one, into space on april 12, 1961.



The famed Vostok. The first craft of this type was manned by Yuri Gagarin (April 1961), the second by Herman Titov (August 1961), the third by Andrian Nikolayev (August 1962), the fourth by Pavel Popovich (also in August of the same year), the fifth by Valeri Bykovsky (June 1963), the sixth by Valentina Tereshkova (same month and year). The many-seater VOSKHOD replaced the one-seater VOSTOK. With Vladimir Komarov, Konstantin Feoktistov and Boris Yegorov aboard, it first went up on October 12, 1964. ▼



This is how the first two Soviet automatic interplanetary stations of the "Luna" type appeared. Luna-1 was the world's first, launched in the direction of the Moon on January 2, 1959. Luna-2 was launched on September 12, 1959 and was the first space apparatus to land on a heavenly body. Luna-2 delivered pennants with the emblem of the USSR to the Moon.



Luna-3 was launched on October 4, 1959. It photographed the other side of the Moon. It was the world's first study of a celestial body from on board a space apparatus.



◀ On February 3, 1966, Luna-9 made the world's first soft landing on the moon. It conveyed the moonscape to earth. Luna-13, the second Soviet automatic interplanetary station to make a soft landing on the moon (on December 24, 1966), looked exactly the same.



▲ Molniya-1. Soviet communications satellites intended for relay of television programmes and telephone and telegraph connections are thus designated. The first "spuznik" of this type was sent up on April 23, 1965. The third Molniya-1 satellite was used to exchange TV programmes between France and the Soviet Union.



◀ Venera-1 — the first in a new series, was launched toward Venus in 1961. In 1962, launching towards Mars began.



Test for kindergarten teacher applicant.



You'd better eat it, Adam, you won't be getting anything else. I'm on a diet.



One more game and I promise I'll let you go.



V.J.P.



They say it's the latest thing abroad.

The cartoons on these pages are the work of Yevgeni Gurov, who is a regular contributor to the satirical magazine KROKODIL. In future issues SPUTNIK will run more of Gurov's and other KROKODIL cartoonists' work.

TRADITIONAL FESTIVALS OF THE ARTS IN THE USSR — A PARADE OF STARS!

Each year these festivals are held in the USSR:
May 5—13 in Moscow — "Moscow Stars"
June 21—29 in Leningrad — "White Nights"
December 25—January 5 in Moscow — "Russian Winter"

On the festival programmes are the finest operas and ballets, the finest symphonic, instrumental and vocal works; we present the art of the peoples of the USSR — their music, their songs and dances, their concerts and circus shows.

Special festival tours may be bought from INTOURIST. Only during such festivals can you see the whole diversity of talent of the best of our Soviet artists.

Festival tours are sold at special advantageous rates.

They include visits to performances on the festival programme: a 5-day tour includes 4 visits to the theatre, a 10-day tour includes 8. Apart from that, the "Russian Winter" Festival includes a gay NEW YEAR celebration. Some unusual entertainment awaits you: only in Russia can you go sleighing in a "RUSSIAN TROIKA", take part in a Russian ring dance round the New Year tree, try Russian pastiches and drink a glass of Russian vodka.

Tourists are guaranteed excellent service, comfort and unfailing Soviet hospitality.

WELCOME TO OUR FESTIVALS
IN THE SOVIET UNION!
GREAT FEASTS OF SOVIET ART!



Intourist

Detailed information from the INTOURIST bureaus in your country or from tourist firms acting as agents for INTOURIST:

Our Address: 16 Marx Prospect, Moscow K-9, Telephone: 292-32-00, Telex: 216, 213

The Soviet troupe **Ballet on Ice** is still very young as groups go. It was organized 12 years ago by Leonid Lavrovsky, leading Soviet ballet master who for many years headed the ballet troupe of the Bolshoi Theatre. At the present time **Ballet on Ice** is being managed by one of Lavrovsky's most talented pupils, Yevgeni Changa, who in his work consistently implements the principles of his teacher.

What are these principles?

Perhaps the critic from the German magazine *Artistik* was closest when he wrote after seeing the troupe perform in the German Democratic Republic: "In all ice reviews that I have hitherto seen, brilliant skating technique is set off by sumptuous costumes and served up within the framework of a simple plot. In the Moscow show, the mastery of the performers is entirely subordinated to the thought, the content. And so the audience sees a real play interpreted in the specific form of a ballet on ice, a medium which the performers handle with such perfection that the spectators constantly burst into applause."

In addition to their popularity at home, **Ballet on Ice** has invariably enjoyed success abroad. Over 10 million people in countries such as Romania, Poland, Finland, Czechoslovakia and Turkey have seen and applauded this talented troupe which continues its creative search for the new.

ICE AND FANTASY







These form the subject of the first series of Soviet postage stamps devoted to works of art in Soviet museums.

From the series of nine, we reproduce four:

V. A. Tropin: "The Loommaker" — 4 kopecks

T. N. Yablonskaya: "Bread" — 6 kopecks

P. D. Korin: "Alexander Nevsky" — 6 kopecks

G. G. Nizhny: "Near Moscow, February" — 16 kopecks

For the information of SPUTNIK

readers, a second series of postage stamps has been issued with reproductions of paintings by Russian and Soviet artists which are in the collection of the Russian Museum in Leningrad. At the present time a series of stamps is in production which will depict the masterpieces from various museums in the USSR by some of the world's greatest artists.



The Tretyakov Gallery: Treasury of Russian Art

by Polikarp LEBEDEV.

Corresponding Member of Soviet Academy of Arts,
Director of the Tretyakov Gallery

from the magazine OGONYOK

There are few other art galleries in the world which attract, as the State Tretyakov Gallery in Moscow does, 4,000 visitors a day and 10,000 on holidays. This gallery's 54 halls house one of the biggest collections of Russian art in the world, known to art lovers everywhere.

Founded by Pavel Mikhbailovich Tretyakov in 1856 and presented by him as a gift to the city of Moscow in 1892, together with the art collection of his brother Sergei, the gallery after a century of existence now boasts more than 40,000 pictures, drawings, sculptures and icons by foremost Russian artists, representing all periods from the eleventh century to the present.

One hundred and fourteen years ago, the young Moscow merchant Pavel Tretyakov, then only 26 years old, inherited a vast fortune and began to establish a collection of Russian art. He was not the first to do this, of course; there were earlier collections of Russian art in the Czar's court, in monasteries, churches and so on, and indeed in the eighteenth century distinguished art patrons had made the collecting of Russian art something of a fad.

By the mid-nineteenth century, St. Petersburg could boast of Fyodor Pryanishnikov's comparatively large collection, and another was established in Moscow by Vassili Kokorev, but neither these nor other collections of the time could match Pavel Tretyakov's unique contribution to Russian cultural history. As he wrote: "An ardent lover of painting, I have no greater desire than to found a public collection of fine arts that will benefit many and give pleasure to all."

Pavel Tretyakov began his collection with two paintings by Russian artists, and soon warmed to the task of collecting works of the Russian school, always exercising great discernment and taste. Fidelity of representation and sincerity were the two qualities that Tretyakov most appreciated in painting. From the moment he first encountered those Russian



PAVEL TRETYAKOV
painted by I. Kramskoi

painters still held captive by the idealistic academic canons of the time, Tretyakov knew he was correct in his approach. Rejecting a landscape he had commissioned from one such painter, he said: "I need no lush scenery, or exquisite composition, or spectacular light effects, or any miracles whatever. A muddy pool would be acceptable to me provided the picture remained true to life and had lyrical qualities — and lyrical qualities can be found in everything: it is the artist's job to find them!"

Progressive Russian intellectuals of the time welcomed his initiative, and noted critics and artists frequently gave him helpful

advice, many of the artists gladly letting him have their works at a big discount. Tretyakov himself confessed that he was indebted to the generosity of artists for many works in his gallery. As all Russian liberal-minded intellectuals of the latter half of the nineteenth century gave their support, the gallery's founder became a cultural figure of national standing and a recognised art authority, one who gave the palm to all the best that was to be found in Russian realism, at the same time displaying amazing impartiality.

In the seventies he began to pay attention to Russia's early masters, and was the first to give prominence in the art world to the hitherto largely unknown eighteenth century paintings. The gallery was beginning to take on the character of a chronological presentation of Russian art, and to this Tretyakov added a magnificent collection of portraiture, as he commissioned portrait after portrait of leading scientists, scholars and other cultural figures.

Tretyakov regarded the building of the collection as his duty to society, it was said at the time, when he was described as "not an art patron, but an important social worker".

Four years before he died, Pavel Tretyakov presented his collection, and that of his late brother Sergei, as a gift to the city

of Moscow. It contained about 2,000 items. Now it is housed in a building with a rather quaint, fairytale-like facade, standing in the little Lavrushensky Street on the opposite side of the Moskva River from the Kremlin, and within sight of it. The facade itself, bearing the emblem of St. George slaying the dragon and an inscription commemorating the gift done in old Russian script, was designed by the artist Victor Vasnetsov in 1902. The inscription makes it clear that the gallery is named after both Tretyakov brothers.

In 1918, after the Revolution of October 1917, the Tretyakov Gallery was nationalised under a decree signed by V. I. Lenin, head of the Soviet Government. Now it belonged not just to Moscow, but to the whole Soviet state, which endowed it, with the result that a tremendous stream of Russian art began to flow into the gallery from all parts of the country.

All the best works of Russian art found in museums and private collections in other cities found their way to the Tretyakov Gallery. Previously scattered all over a vast area and therefore available only to the few, they richly supplemented the collection, filling in gaps and justifying the founder's hopes of making it fully representative. For instance, the

additions included Fedotov's "Fresh Suitor", Briullov's "Self-Portrait", Ivanov's "Christ Appearing to the Multitude", and many other first-class works which Tretyakov had often admired and dreamed of being able to include in what he had hoped would become an art museum for the whole people. In Soviet times, the picture collection has grown tenfold.

From the twenties, the gallery's collection began to include the works of Soviet artists — not only painters but also graphic artists and sculptors. All available classics now find their way to the Tretyakov, as they reach this stature — for example, works by Deineka, Saryan, Nesterov, Korin and other representatives of the older generation, and also the younger masters.

Private collections, both Soviet and foreign, continue to send their tributes to enrich the gallery's collection of eighteenth and nineteenth century works, and sometimes art scholars add to it by unexpected finds.

The Department of Early Russian Art is continually acquiring new treasures discovered by the gallery's experts who go out on expeditions. For a layman, a stout piece of board he might chance upon in some remote northern district might not seem worth a glance, but one of the Tretyakov's wizards handles it as he would a precious stone.

From such inconspicuous signs

as the way the board has been cut or how it has been made to hold together on the reverse side, they can determine an icon's age and consequently its historical and artistic value. Carefully, the restorer removes all the layers of overpainting from the valuable original.

The gallery's range of activities is wide. It provides facilities for 40 different types of visiting groups (there are 14,000 of these every year); it sponsors three or four substantial exhibitions every year, it mounts travelling exhibitions at home and abroad — in France, the USA, Japan, Sweden, and other countries, it arranges lectures and even courses of lectures on art history and it also supervises fine art study circles.

Visitors from afar make it a point to visit the Tretyakov Gallery when in Moscow, just as they did in 1874 when the gallery was first opened to the public. Ninety-five years ago the visitors could be numbered in thousands annually, but nowadays they have swelled to 1,500,000, leaving little room for themselves or indeed the pictures — so much so, that the celebrated Tretyakov Gallery will soon be moving to new quarters in a huge building going up nearby, on the bank of the Moskva River.

V. BOROVIKOVSKY —
"PORTRAIT OF M. I. LOPUKHINE"





K. BRYULOV —
"THE HORSEWOMAN"



PORTRAIT OF L. N. TOLSTOY
I. KRAMSKOI —



N. GE —
"PETER THE FIRST
QUESTIONS TSAREVICH
ALEXEI PETROVICH IN PETERHOF"

"ALYONUSHKA"
V. VASNETSOV —



I. LEVITAN — "GOLDEN AUTUMN"

A. ARKHIPOV — "LAUNDRESSES"

E. JOHANSON —
"INTERROGATION OF COMMUNISTS"G. NISKY —
"NEAR MOSCOW, FEBRUARY"



A. PLASTOV
— "TRACTOR-DRIVERS' SUPPER"

M. SARYAN
— "WISTARIA"



A. DEINEKA — "THE DEFENCE OF PETROGRAD"

gone, he had noticeably filled out and his smile was dignified and measured.

"How do you do, comrade Vishnyakov. It was I who telephoned you."

"You?"

Shurik did not seem to notice my astonishment, took me by the elbow and with a laugh enquired:

"So you're parting with your chief mechanic?"

"That's right. The old man is going on pension. How did you know?"

"No matter," he waved the subject away. "You only have three days in port. The Line has assigned me to organize a fitting farewell. Do you know the Café Fialka?"

"I've been there."

"Tonight at 20 hundred hours a farewell banquet has been arranged. Part of the cost is being taken care of by the trade union, the extras depend on you. I believe your old man is a bit of an eccentric? He collects buttons, doesn't he?"

Nothing could surprise me any more and I resignedly agreed that he did.

"Of course I haven't found anything unique, still . . . I have an unusual button from the uniform of a Nicaraguan policeman."

Shurik dropped his hand from my arm and saluted lightly.

"Inform the crew of the banquet. Good-bye."

"Just a minute," I implored. "Where are you working now?"

"I'm in the Planning Department."

"The Planning Department? You?"

"Yes," he nodded. "I decided to teach myself to do paperwork."

"Do you intend to go to sea again?"

"Certainly! But . . ."

Shurik looked embarrassed and even reddened.

"You see, Vishnyakov, I recently got married. You know, you can't very well get married and go right out to sea . . ."

The news about Shurik and the Café Fialka was greeted in a variety of ways. The Captain vaguely muttered: "Interesting . . ."

The boatswain, in his characteristic manner, announced:

"Smells fishy to me. Shurik is Shurik."

At exactly 20 hundred hours, the whole crew of the tanker with the exception of two unfortunates who had to stand duty, arrived at the café. To this day I don't know why we didn't all undergo a mass heart attack.

The tables on their aluminum legs were put together in two parallel lines connected by a head table and covered with snowy white cloths. Crystal vases held dazzling bunches of flowers obtained God knows where, at God knows what cost here in the North. Mounds of black caviar gleamed dully, the variety and quantity of hors d'oeuvres staggered the imagination. And along the walls stood fairy-tale princess-

ses in starched ruffles who bewitched us with their welcoming smiles.

The first to gather his wits together was our radio operator, Slava Rogovin. He turned on his heel and headed back to the door.

"I'm dreaming," he said.
"Oh no, you're not," said a thin figure who materialized beside Rogovin. "I'm the manager: Shurik asked me and I did what I could. Please sit down, comrades. Shurik will come later."

The head of the Line, the chief engineer, and innumerable other bigwigs whose existence we had never even suspected turned up to pay tribute to our chief mechanic.

As for Shurik, he never did turn up and we at once forgot about him.

Early in the morning the telephone in my cabin rang shrilly.

"This is Serokhin..."

"Who?"
"You know, Shurik," the voice was hesitant. "I wanted to know, to find out, whether you enjoyed last night's banquet? Did everything go alright?"

"Magnificently!" I changed my tone and lied without a blush. "Why didn't you come? We all kept expecting you."

"Something turned up and I was kept busy," Shurik replied and hurriedly rang off.

Once I ran into Shurik in the offices of the Line and I asked him point blank:

"Why do you avoid us?"

"I don't want to meet your Captain."

"You're not still angry with him?"

"On the contrary!" Shurik smiled and his blue eyes peered out sadly from beneath thick lashes. "He helped me find myself. Because of him I found the only path that's right for me. But I'm sure he thinks I'm not a man, that I'm a nothing. We think and speak in different ways. I couldn't explain to him. That's why I have no desire to meet him..."

They never did meet again.

Deepsea Captain Yuri Alexandrovich Shurga died during my watch, when we were returning to our home port and were only 24 hours away.

He went up to the conning platform in the morning, according to the ship's log at 06.03, said good morning, moved to starboard and it seemed to me that he slipped and would in a moment swear and let loose a salty joke.

He did not swear or joke. He slowly sank to his knees, fell forward, and his forehead woodenly hit the deck. A splash of blood appeared on the grey temple.

The man at the wheel shrieked in a strange voice, like a woman: I threw myself toward the Captain and then reeled back, screwing my eyes shut against the blind, transparent stare of the dead eyes.

Even now I am unable to re-

create the scene in my mind's eye. I am not sure whether the navigator or the doctor was the first one in the wheelhouse.

I began to think again after the navigator painfully squeezed my shoulders and said in a calm voice:

"Assume your duties, Vishnyakov."

I trudged off to the navigating room, opened the log, and in a trembling hand, with difficulty, managed to write down the ship's position and the time of the Captain's death.

The radio operator, Slava Rogovin, appeared on silent feet and handed me the text of a radiogramme to the Line.

"Sign it, please..."

Only the Captain has the right to sign.

The Captain was dead and at last I realized that until we reached port I was commander of the vessel.

I returned to the wheelhouse. Yuri Alexandrovich had already been carried down to his cabin. The third mate and a new sailor had taken over the watch. I checked our course, phoned down to the engine room. Everything was in order. The diesels throbbed dully, the gyrocompass buzzed comfortably and the silvery foam swished against the metal sides of the tanker. The well-regulated mechanism of the ship took no notice of the Captain's death. But voices were muted, guilty-sounding, as though justifying them-

selves for the indifference of their craft...

For almost four years I had served as chief mate under Shurga. I had received my share of dressings down from him, had been rewarded with his rare smiles. Yuri Alexandrovich, short and wiry, quick of movement, was capable of instant rages, unjust attacks, but he could also honestly admit it and say: "I got carried away, forget it." He was never afraid of compromising his authority. He well knew that he was Shurga.

Much could be recalled about the man, much said...

But in the first few minutes after his death, for some reason one short voyage came to my mind, down to the last insignificant detail...

* * *

Last summer our tanker, badly battered in Atlantic storms, was temporarily switched to ferrying fuel for a polar airfield. We were awaiting our turn at the repair docks and in order not to have us sitting idle, the assignment was thought up. We would load at night, travel for six hours along the bay and we were there. It took four hours to pump out the fuel and we would start back. Like a floating streetcar. So I was really astounded to see the chief of the Line turn up. And not alone. With him was an awesomely slender creature in a miniskirt, fishnet stockings and platinum-blonde hair.

The chief seemed nervous and ill-at-ease. Several times he took out a package of cigarettes and then recollected that he was on a tanker and slipped them back.

As for Captain Shurga, he rushed about the cabin and was not sparing in his choice of expressions. The chief had arrived with orders that Shurga was to take a trade union delegation aboard from a certain major maritime power. The delegation had arrived from Moscow and wished to observe our conditions of work at sea.

Shurga insisted that the tanker was in terrible shape, the diesels were barely functioning, the navigator was on leave. He appealed man to man: his was a tanker, not a passenger liner and what the deuce did he want with a bunch of tourists?

However, a chief of a Line is a chief of a Line. The outcome was inevitable. Shurga simmered down and power passed to the frail creature with platinum-blond hair. The creature called herself Nina and taking a sheet of paper out of her bag she began in a firm voice to read a list of instructions. At 6 p.m. on the dot we were to weight anchor. Between six and eight our delegation was to familiarize itself with the ship and meet the crew. At 8 p.m. there was to be dinner with a limited amount of drinks (the liquor would be delivered). At 9 p.m. the delegation was to rest. The routine for the return trip would be announced later.

"Remember, Yuri Alexandrovich," the chief warned, "do exactly as Nina advises. She has accompanied them all the way and she is responsible for them."

They left and Shurga organized a gigantic clean-up campaign. Until nightfall we rubbed and scrubbed, washed and polished our tanker.

After it was over Yuri Alexandrovich peered into all the nooks and crannies and then went to change. For the first time I saw decorations on his uniform. Besides various medals, he bore three orders which explain everything about a man: the Order of Lenin, the military Order of the Red Banner and the civilian order of the same name. A little lower, on a long ribbon, hung a cross that was unknown to me. I asked about it and Shurga replied that he had received it during the war from the country of our expected visitors.

Shurga welcomed our guests standing on the dock at the foot of the gangplank. He managed to produce a wonderful smile and shook hands warmly with each member of the delegation.

The first to mount the gangplank was a portly fellow with a briefcase. The rest followed. Suddenly one of the men, as though he had forgotten something, rushed back down, almost knocking Nina off her feet. A huge bear of a man, he enveloped our Captain in an embrace and roared: "Yur, Yuri!"

Our diminutive Captain disappeared in the bear hugs but his joyous voice could be heard:

"Harry! Harry! The devil take you!"

The delegation was dumbfounded. Nina's cheeks turned the same colour as her hair.

The two below were quite oblivious. They kept punching each other and laughing and hugging. Then they both sprinted up and the huge man announced in ringing tones:

"My wife knows about Captain Yuri, my children and grandsons know about him. I thank God that we have met again."

Then he told us how he first met the Captain in 1942. German subs and planes had broken through the destroyer escort and attacked a convoy on its way to Murmansk. The vessel commanded by Harry was torpedoed amidships and had broken in half. The crew had no time to lower lifeboats. Lifeboats were put down by Shurga from his ship. The convoy left them far behind but Shurga stayed and under constant attack by Junkers, defending the ship with a puny little cannon and a machinegun, continued to rescue half-dead sailors from the freezing waters. And he did. He picked up all the men including Captain Harry. On Shurga's vessel a bomb had exploded in the bow, killing three and wounding five seamen. Yuri Alexandrovich suffered a contusion, was blinded in the right eye and did not regain his vision

until a month and a half later.

Having listened to the story, the members of the delegation insisted that the two embrace again before cameras. I invited the guests to inspect the cabins that had been set aside for them. Shurga went up to the bridge and at last we set sail.

After they visited their cabins, in accordance with marine etiquette, they requested permission to be present on the bridge. Shurga gave permission but began to tease Harry.

"You're interested? As a trade union boss?"

"I'm first of all a seaman," Harry replied.

"Come off it," Yuri Alexandrovich scoffed. "You're just a chairwarmer these days."

"I'm a seaman first," Harry doggedly repeated and then challenged, "I can plot your course for you. But of course you people are wrapped in secrecy."

"Why?" Shurga shrugged his shoulders. "First mate, conduct Mister Harry to the navigation room."

That is how that unusual, brief voyage began.

Mister Harry, having taken off his coat and rolled up his sleeves, sat hunched over the chart of the bay, while two other members of the group recalled that in the past they had been mechanics, and donning overalls they disappeared into the engine-room. Only the fat fellow with his briefcase remained and he soon slipped away to his cabin with a grunt

of disapproval.

Poor Nina was fearful to see. At first she called me aside and began to whisper excitedly about the unprecedented breaking of protocol, about the schedule that was ruined and the unbelievable complexities in store for us. Then she stormed at Shurga. Yuri Alexandrovich continued to look her gently in the eyes and soothingly calmed her:

"Don't fret, it's bad for you. And let them feel again that they are seamen, even if only for a short while."

For four hours — a full watch — Mister Harry stood with Shurga, and for four hours the two former mechanics did not emerge from the engine-room. I don't know whether they did any good or not, but when they did turn up they were cheerful and thickly smeared in fuel-oil. They headed off to the showers and at dinner spoke knowledgeably about what exactly was wrong with our engines and what needed repairing.

Mister Harry invited the fat fellow with the briefcase to dinner but he refused and Harry winked at Yuri Alexandrovich.

"Now he's a boss. A boss and nothing more."

Nina tried to whisper to Shurga, to remind him about the planned limited quantity of spirits.

Shurga sighed and spread his hands. "They're sort of part of the crew. And a crew is not permitted..."

The liquor was drunk on shore during the day, in company with the harbour master and Arctic pilots. By all appearances, the quantity somewhat exceeded that planned by Nina.

In full dress uniform, Shurga once again greeted his guests at the gangplank. He held the ship's log in his hands and requested each of them to sign it.

Harry, swaying slightly, was indignant. "You're a bureaucrat, Yuri!"

"No. Simply I've never yet had a drunken crew. As for passengers — that's up to them."

The joke was appreciated.

"Khorosho!" Harry roared. "Khorosho!"

Further Russian words eluded Harry and he finished in English: "Khorosho — it is good that men like Captain Yuri exist in this world. Hip-hip-hurrah!"

Captain Yuri, Yuri Alexandrovich Shurga exists no more. And it is not likely that jovial, bear-like Mister Harry will ever know how the man who picked him up from the Barents Sea died...

The Line reacted quickly to the first radiogramme signed by me. "Slow ahead. A tug with everything necessary has sailed and will intercept you."

"I can't understand," Slava Rogovin muttered, "what it is that we need."

"Not us, it's for him..." the navigator said in a low voice. "His family will be there, at the dock..."

The coffin for Yuri Alexandrovich was brought by Shurik. They came along our port side and Shurik jumped on to our deck. He jumped professionally, capably, like a sailor, as though he were still in the sea-going fleet. He gestured and a red, velvet-covered coffin swung up over his head. The electric motor of the winch buzzed, both vessels rolled in the easy swell and everything seemed barbarous and incompatible — the rescue tug and a coffin, the dead Shurga and busy Shurik, whom a few years earlier Shurga had tried to teach paperwork...

"The place of the Captain is on the bridge," Shurik ordered, "with guard of honour. Two members of the crew in dress uniform, 15 minutes each watch."

No one asked him where this ritual had come from, everyone obeyed him instantly.

The tug cast off and disappeared in the open sea. Half an hour later the navigator handed me the binoculars and said:

"That's odd. What's the Desna doing here? I remember perfectly that it was due to sail east."

The Desna explained herself. Having approached closer, the old steam cargo freighter blew her whistle long and desolately. The Desna had heard our message and the seamen had turned off course, done a half-circle, in order to pay their last respects to Yuri Alexandrovich. The men would now have to work feverishly pumping coal into the furnace

and squeezing every bit of steam out of the ancient boilers in order to make up for lost time.

After the Desna, the tanker Tyumen paid us a funereal tribute. The hoarse voice of the tanker differed from the velvety steam whistle, it rasped at the nerves and tore at the heart. The Tyumen, too, should have passed far south of us...

The closer to port, the more frequently we encountered vessels, and they all responded to our grief.

I did not at once comprehend what Slava Rogovin wanted from me.

"He's cracking up."

"Who?"

"Shurik. He's in your cabin."

Shurik was weeping. The jacket of his uniform was lying crumpled on the cot, his tie was undone and big tears rolled down puffy cheeks.

"What for? What for, Vishnyakov?" he threw himself at me. "Is it my fault?"

I barked: "Sit down! Drink a glass of water!"

He obediently drank and a twisted smile distorted his features.

"If it was me," he sobbed, "if I die... No one will salute me at sea! But I do good for people! Or isn't that true? Tell me, Vishnyakov!"

He spoke the truth, but I didn't say anything. Through the open porthole came the melancholy voice of another vessel...

by Alexei AKULOV
Exclusive to SPUTNIK

The Life-Saving Scalpel

Surgical Treatment of TB

Comparatively recently, in the 1920s, a world-famous British specialist in tuberculosis, Joseph Morton, claimed that opening a tubercular focus was tantamount to opening the door for Death to enter.

Other specialists were even more categorical. How could infection be fought surgically? How could TB be combatted with the scalpel? A perfectly absurd idea!

But the traditional ideas of phthisiology were exploded. Soviet surgeon Lev Bogush, over a period of 40 years, demonstrated that the scalpel can in many cases be an effective weapon against lung tuberculosis.

"Consumptive sorrow," as this disease was called by seventeenth-century Russian physicians, resembles influenza in some ways. Like flu, it is contagious. The source of consumption is also a bacterium, discovered in 1882 by Robert Koch and hence named "the Koch bacillus". But tuberculosis possesses many distinctions from influenza and lends itself to surgery.

Unlike other infectious diseases, most of which spread to the whole of the body, tuberculosis is more or less localised. Its microbe affects only some of the organs, and these not always wholly.

The TB microbe is capable of affecting the alimentary tract,

The man who performs miracles: almost all the tubercular patients operated on by Lev Bogush recover from their illness.



The war which Bogush wages against TB invariably continues after hours when the surgeon exchanges his scalpel for pen and paper.

bones, joints, skin and eyes. But in 95 per cent of the cases it attacks the organs of respiration.

Exposed to its destructive effects, the tender pulmonary tissue grows a tubercle. A group of tubercles forms a focus. Foci may fuse together into a cavern — a large area which in an X-ray picture forms a dark spot: it is a mass of pus. Whatever its shape it is a host of bacteria that slowly but surely expand their breeding-ground by destroying the neighbouring tissues, which previously were healthy.

Apparently, at the start of this process the bacilli spread over comparatively small individual areas. It is a slow process, lasting for years, even decades. Then why not arrest this relatively slow expansion by the timely surgical removal of its source, in cases where the usual remedies (say, treatment with chemical drugs) were powerless? Such was Dr. Bogush's reply to his critics.

One of the pioneers of surgical treatment of consumption was Vizenzo Monaldi of Italy. Operating in the late 1920s he would tap the thorax and remove what was in the cavern. That brought the disease to a halt, but only in a few instances. In the absence of effective techniques to thoroughly disinfect the cleaned cavity, its

edges often infected the healthy tissues around it.

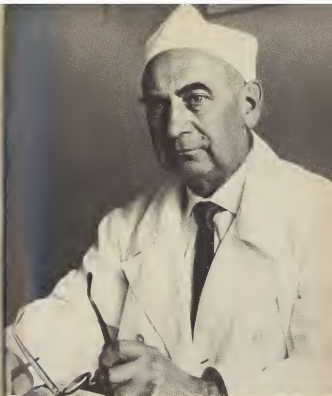
To uproot the hotbed of infection, the whole of the cavern must be removed, together with the surrounding tissues. Dr. Bogush drew this conclusion back in the 1930s, when he worked in Gorky, a city on the Volga.

So radical a solution alarmed some of his conservative-minded colleagues. And not groundlessly: nearly all attempts to open up the tubercular focus led to further infecting the lung. That, in some cases, hastened the death of the patient.

But Dr. Bogush, whose own wife and son had been victims of consumption, carried on his work of developing surgical methods in phthisiology.

In 1933, when he was a 28-year-old intern at the Gorky Medical College, he opened the thorax of a patient believed to have no hope of recovery and bound the veins which led to the cavern. The attempt to block the spread of infection by way of the bloodstream was a success.

This innovation of the Soviet intern, later expounded in his *Surgical Treatment of Tuberculosis by Binding Pulmonary-Lobar Veins* (a thesis which earned him the Doctor's degree) gained world recognition. First tens, then



In his own clinic, in Moscow's Central Institute of Tuberculosis.

hundreds and finally thousands of people whom this technique saved from death disproved, by the very fact of their survival, the pessimistic view of the eminent Dr. Morton.

In 1947 Dr. Bogush, who had already proved the promise of partial removal of the pulmonary tissue, cut out, for the first time in his practice, the whole of a TB-affected lung. The woman whom he had operated on lived another 18 years, dying of flu in 1965.

Dr. Bogush has performed thousands of operations over a period of several decades. A Member of the USSR Academy of Medical Sciences and the author of over 200 research papers, he is now head of the surgical clinic at the Central Institute of Tuberculosis in Moscow, which has a record of curing 94 per cent of its cases. This is a very high proportion, some ten times higher than in those early days when Dr. Bogush defended incipient surgical methods in phthisiology from attacks by pessimistic critics. And Dr. Bogush is certain that the incidence of cures can be raised still higher.

He has developed his own school of lung surgery, a school which has earned well-merited recognition in his own country and abroad.

A monograph on surgical treatment of caverns, recently published in Japan, lists Dr. Bogush next to Monaldi and other authorities on lung surgery.

On many occasions his foreign counterparts have invited Dr. Bogush to their countries to share experience. In 1955 the surgeon demonstrated his technique of pulmonary operations in Bulgaria. The years of laborious effort exerted by Dr. Bogush and other pioneers of lung surgery with their many trials and errors, their disappointments and failures, have finally produced tested, reliable techniques whose perfection has itself placed them within easy reach of large numbers of specialists.

With the advanced techniques of today Dr. Bogush's virtuosity remains desirable but is no longer absolutely essential.

In 1961, with Dr. Bogush taking part and with the help of Soviet apparatus UKL-60, a patient in the clinic of Dr. Michel Dabruet, Birmingham, had part of his lung removed. The operation took a mere 20 minutes. That is what can be achieved by well-tried techniques.

Dr. Bogush is now 65 but retains his questing spirit, the spirit of a restless explorer of untrodden territory.

In 1969 Dr. Bogush's surgical skill produced a sensation in Berlin. The Soviet doctor stitched a chronic fistula of a patient's main bronchus without cutting away his ribs. The surgeon had reached the gaping hole in the respiratory tract which leads from the throat to the lung through the breastbone and the pericardium. That was a difficult operation, which few surgeons can perform. But it rules out the crippling deformation of the thorax caused by a removal of ribs. That guarantees the patient, in addition to complete recovery, retention of normal carriage and good build.

The GDR Society of Phthisiologists has awarded the Robert Koch medal to Dr. Bogush.

The Soviet Government has conferred several orders and the Lenin Prize on the surgeon.

In private life, the man who dared to pioneer a scalpel attack on the Koch bacillus and wage a sustained well-argued campaign against opposition to lung surgery, does not at all look like a stern, selfless fighter. He is a man to whom nothing human is alien, a good-natured person and a born optimist, whose debates over the years with various opponents have shown his immunity to the bacillus of pessimism. He is

a hospitable host with a talent for cooking and a love of eating. An enthusiastic "hunter", Dr. Bogush likes to boast about his "super-trophies". The surgeon collects arm-rests of period easy-chairs, and his endless talk about antiques can either kill all desire in the listener to go in for collecting or, on the contrary, kindle an insatiable urge for it. Gazing from time to time at the stars through an amateur telescope in his summer cottage, the man protests against his wife calling him an "admirer of Urania, the muse of astronomy". His daughter, who studies music, adds that her father is a "near-melomaniac": he never runs away holding his ears when he hears her piano exercises. What is more, he listens to them benevolently, she says.

But in the eyes of the people whom this Moscow professor has brought back to life and who send him letters of gratitude, in the eyes of his fellow-surgeons, followers and pupils, who are capable of appreciating the real value of his contribution to the fight against TB, Dr. Bogush will always remain, above all, a daring pioneer of lung surgery who, contrary to the views of the majority, attacked with scalpel in hand an infectious disease and chalked up impressive victories in a battle against the Koch bacillus.



The man who was one of the first to lift a scalpel against the dreadful disease should not be thought of as a sour man who knows neither sleep nor rest in his unending struggle. In his summer home near Moscow (left and below), on a hike in the Caucasus (upper right) or during holidays on the Black Sea (below right), he is a most ordinary man who enjoys life and to whom nothing human is alien.



Byelorussian Cuisine

Potatoes enjoy a favoured spot on the menu in Byelorussia. Any cook worth his salt knows dozens of ways of preparing that native of the Andes that has spread throughout the world. Here are some of them.

STUFFED POTATOES

For 4 portions	
Potatoes	3 lbs
Beef	1 lb.
Onions	3 or 4 medium-sized
Tomato paste	1 Tbs
Sour cream	½ cup
Flour	1 Tbs
Parsley or dill	1 Tbs (chopped)
Cooking oil	1 cup
Salt, pepper	to taste

Mince meat together with the onions, salt and pepper to taste. Peel potatoes and in each scoop out a hollow, fill with meat and then fry in oil until golden in colour. Place the stuffed, browned potatoes in a deep casserole. Mix the tomato paste, sour

cream and flour together, pour over potatoes and place in oven for half an hour.

When serving, pour the sauce the potatoes have been cooking in over the dish and sprinkle with parsley or dill.

KHVOROST

For 4 portions	
Potatoes	1½ lbs
Flour	1½ lbs
Egg	1
Cooking oil	1 cup
Salt	to taste

Peel potatoes and boil in salted water until done. Drain, cool and dry. Then put either through vegetable grinder or grate finely. Add flour, egg yolk and whipped white. Roll the mixture out and cut into diamond-shaped figures. In each one make a slit in the centre. Fry in vegetable oil until crust is golden.

The khvorost can be served with meat and fish entrees or on its own, with sour cream or milk.

BULBYANIKI

For 4 portions	
Potatoes	3 lbs
Starch or flour	2 Tbs
Butter	2 Tbs
Egg	1
Sour Cream	1 cup
Onions	2 or 3
Salt, pepper	to taste

Boil potatoes in their jackets, then peel. Either mince or grate finely, add starch (or flour), butter, egg, salt and pepper to taste. Mix together thoroughly and form into small balls. Then bake for 8 to 10 minutes, sprinkle with finely chopped onions, cover with sour cream and bake for further 5 to 7 minutes. (The name of this dish is derived from "bulba" which is Byelorussian for "potato".)

DRACHENA

For 4 portions	
Potatoes	3 lbs
Flour	2 Tbs
Pork fat	2 oz
Onions	2 or 3 medium-sized
Butter	2 Tbs
Baking powder	pinch
Salt, pepper	to taste

Cut onions and fat into fine pieces. Fry together. Grate peeled, raw potatoes and add flour, salt, pepper, baking powder and the fried onions and fat. Mix the ingredients well and then spread evenly over a buttered baking dish and put in oven for 20 to 25 minutes.

Serve hot with melted butter.

In our NEXT ISSUE

Why one political party in the USSR? (conclusion)

Marshal Zhukov refutes falsifications about the course and outcome of the Soviet people's Great Patriotic War against nazi Germany.

Feature story about the Cherepovets metallurgical giant and its young managers.

Science Helps in Fight Against Crime

Had Sir Arthur Conan Doyle (1859-1930) lived today instead of when he did, perhaps the world would never have known his famous character, Sherlock Holmes, the prototype of criminologists who rely on precise methods of investigation including forensic medicine and chemistry. For the fact is that modern detectives have at their disposal many more scientific means, and a vast army of experts to help them, thus narrowing the scope for the kind of intuition or inspired guesswork with which Conan Doyle endowed his hero, and which Holmes used with such genius. On the other hand, Conan Doyle, writing today, could make his master sleuth even more successful, as the Holmesian technique is still an important part of the basis of crime investigation, as is shown by the following examples from Soviet experience.



by Mark KISIN, M.Sc. (Medicine), Colonel of Militia and Victor SNETKOV, M.Sc. (Law), Lieutenant-Colonel of Militia

from the magazine
NAUKA I ŽIZN

When crime investigators of the militia arrived at the scene where a boy had been found lying unconscious on a roadside, with his smashed bicycle in a ditch nearby, it was obvious that he had been the victim of a hit-run driver. The only apparent clues were footprints, a crumpled piece of pa-

per, a cigarette butt of the Novost brand, tyre tracks on the bitumen road surface and a yellowish smudge on the bicycle's chromium-plated mudguard.

Experts immediately applied a special organic silicon polymer (SKTN) to the footprints and tyre marks to obtain a white, rubber-

like film recording all the minute details of the impressions.

This was the first application of science to the investigation. The polymer technique was comparatively new at the time, as previously similar, and less satisfactory moulds, which did not stand up to handling during transportation, had to be made from plaster or plasticine. The polymer mould can not only be used over a wider range of temperature (from -40° Fahrenheit to 140°), but can take impressions from loose surfaces such as sand or snow as well as from hard surfaces.

In the case under investigation, laboratory tests at the local department for Defence of Public Order disclosed traces of lilac-coloured lipstick on the cigarette butt, and as analysis of the smear showed that it contained fat-soluble dyes not used by Soviet manufactures of cosmetics, it was assumed that it was imported lipstick.

When the piece of paper was treated with reagents, fingerprints showed up. Examination of the yellowish smudge on the bicycle mudguard, as well as of the tyre marks, convinced the investigators that the lad had been hit by a beige Volga motor car.

Two days later such a car, with a freshly-painted right fender was found in the private garage of a man named V., its owner.

No traces of blood were noticed on the car, even when a chemist sprayed it with a substance which

fluoresces in contact with even the minutest speck of blood.

The car owner would admit no knowledge of the collision, and a friend confirmed that on the night in question V. had been his guest at his country cottage.

Meanwhile, the experts found something that interested them very much in a crack in the car's body — a minute, bluish thread. The cyclist had been wearing a blue, synthetic fibre T-shirt with a torn pocket.

It is only a few years since crime investigators have been able to establish the type of clothing to which a piece of synthetic fibre belongs. A wide assortment of clothing is made from kapron, a Soviet nylon-type material, and an even wider assortment is made from lavyan, a Soviet-made synthetic fabric. In 1964 the authors of this article, together with Y.V. Vasilev, an associate from the Kalinin Institute of Synthetic Fibres, found a method of distinguishing samples of synthetic fibre from one another, and of determining the type and even the particular batch of articles to which a sample belongs. We use a test based on changes in the orientation and configuration of the long polymer molecules that occur when the textiles undergo some treatment such as washing, dry cleaning or pressing.

Using this method, chemists established that the thread found on the car was the same as fibres in the material from which the injured boy's T-shirt had been made. Chemical analysis showed that the

yellowish matter found on the bicycle mudguard had the same composition as the paint on V.'s car, and the size and general shape of the footprints corresponded with V.'s footwear.

However, really indisputable evidence was required. Examination of the suspect's clothing revealed no blood, but some reddish spots were found on his handkerchief. These turned out to be traces of lipstick, of the same kind found on the cigarette butt. Whose lipstick was it? V.'s wife used another brand, Lilac, produced in Moscow. And she did not smoke.

The detectives then turned their attention to V.'s girl friend, K. It was found that she smoked Novost cigarettes and that her favourite lipstick was the imported lilac-coloured kind smeared on the butt.

Even this was not conclusive enough. Chemists examined the traces of saliva found on the butt, because it is known that a person's saliva, like other organic secretions contains substances which are also found in the blood of that person. Chemical and biological analyses coincided, and it was found that the person who had smoked the cigarette had the same blood group as K.

When it was established that the fingerprints on the butt were K's, the circle was complete.

Such a case as we have described is far from being unique. Chemists can, for instance, determine how far a car has travelled since having its last routine oil change, just from examining a

drop of oil found at the scene of an accident. From bullet traces and powder burns they can determine the distance at which a shot was fired, and they can identify the type of ink used to correct a text and thus detect forgeries in documents.

Drivers are well aware of the existence of the Mokhow-Shinkarenko "breathalyser", a tube which shows that a man is intoxicated if, when he breathes into it, the yellow crystals it contains turn green. For a long time it was not possible to establish by this method how much alcohol a driver had consumed, but now A. P. Grishin, an assistant Professor at the Grozny Oil Institute, Dr. V. D. Kalinin, a forensic medicine specialist, and the authors of this article, have invented a device which can tell precisely the amount of alcohol in the exhaled breath.

People working at the Dzintars cosmetics factory in Riga (Latvia), have helped to produce aerosol preparations for developing fingerprints and there are many other examples of this kind of thing which year by year perfects the scientific means at the disposal of crime investigation. Not only chemistry, but the physical, biological and even mathematical sciences are being enlisted in the administration of justice. Genetics, for instance, holds great promise, inasmuch as it is becoming more reliable as a means of establishing paternity in controversial cases. This will be the subject of an article in a future issue of SPUTNIK.



Academician Sergei Korolev and President of the USSR Academy of Sciences, Mstislav Keldysh, examine the interior of a spacecraft.

question: could a living creature exist outside the atmosphere?

The members of the Design Bureau remember that every morning Korolev held operative meetings in the assembly shop. He meticulously checked the fulfillment of all routine assignments and hour-by-hour schedules. There were no words wasted at such meetings and all that was said was very clear and concise. Korolev's iron will made itself felt in everything.

On his insistence, the airtight capsule was equipped with an air conditioner and contained a supply of oxygen and food for seven days. It also had instruments for

Academician KOROLEV

Continued from p. 88

how the idea of the second sputnik was born. It was launched a month after the first sputnik.

The new sputnik was to provide the answer to the age-long

taking the temperature and air pressure inside. The sensors attached to the animal registered its pulse, breathing frequency, blood pressure, biopotentials and movements. The instruments for transmitting telemetric information on the general condition of the dog was installed in the last stage of the rocket carrier. This meant that the capsule with the dog and the container with the apparatus were not separated from the last stage after the sputnik was placed into orbit. The satellite also carried instruments for checking on the ultraviolet and X-ray radiation coming from the sun. The total weight of the satellite was about one and a half tons.

Medical experts under V. Yazdovsky and O. Gzenko were assigned to select suitable candidates for the flight. Among them was the dog Albina which had already made two ascents to an altitude of several hundreds of miles. But then it was decided to spare it on account of its past services because in the coming experiment the dog would not be returned to earth. Finally the choice fell on Laika.

On November 3, 1957 Korolev and his colleagues saw the dog off. For the last time Laika was given water to drink: in the conditions of weightlessness no water could be kept in the capsule because it might get into the instruments. In flight Laika ate special "space food" which contained the necessary amount of moisture and delicious smelling sausage to excite its appetite.

When the rocket took the dog into the unknown the telemetric reports said that Laika was alive, that it had borne the ascent well and that weightlessness had not killed it.

One of Korolev's colleagues recalls his words said at the cosmodrome at that time: "Now we shall add another stage and shall treble the weight of the payload."

And the weight of the third sputnik actually proved to be three times as heavy as its predecessor (1,327 kgs.). At Korolev's suggestion the shape of the second and then the third sputniks was changed from spherical to conical. The third sputnik was twice the size of man and it could carry about a ton of instruments.

The three sputniks were of great benefit to science.

Off to the Moon

Korolev thought and spoke a lot about flight to the moon. Now that an artificial satellite could go beyond the atmosphere, he included a lunar flight in the space programme since there was a space rocket and a control system that made such a flight feasible.

The proposal to launch the first "lunnik" now became the subject of heated discussions at the Design Bureau. Later Korolev called a conference which was attended by well-known Soviet astronomers. In his introductory speech Korolev said: we want to reach the moon, fly around it and photograph its reverse side.

Astronomer Alexander Mikhailov was incredulous:

"Is this possible? It would take more than astronomical precision!"

To this Korolev replied:

"Don't worry. We shall take care of that. Could you suggest what cameras should be used, what exposure should be selected for photographing?"

Taking part in the experiment were not only astronomers, but scientists in other fields.

January 2, 1959, saw the launching of a rocket with a space station mounted on it. Just like the first sputnik, Luna-1 was a small ball, but it weighed almost nine times as much. That was the first explorer of near-lunar space.

Early in the morning of January 3 an artificial cloud appeared in the sky. The cloud was to pinpoint the lunnik's trajectory.

The first lunar station passed five to six thousand kilometres from the lunar surface and became a satellite of the sun.

Eight months later Korolev again arrived at the cosmodrome to direct the launching of an automatic station, Luna-2. It was also spherical in shape; it carried more instruments and weighed 30 kg. more than the first lunnik.

Luna-2 sent back to earth information which enabled scientists to explore the outer edge of the ionosphere of the earth and the outer zone of charged particles. Luna-2 also ejected a sodium cloud. Korolev and his colleague saw it on September 12 for five minutes. The data received from

Luna-2 made it clear that the moon had no radiation belt, and that its magnetic field was 400 to 1,000 times weaker than that on the earth's surface.

Luna-2 reached the lunar surface with pennants emblazoned with the national emblem of the Soviet Union.

The apparatus created by Soviet scientists, designers and workers was on the moon. This was confirmed by observatories in many countries. The astronomers at Upsala (Sweden) photographed a black spot which they watched for almost two minutes over the point of impact.

The year 1959 saw some more outstanding achievements. On September 12 another rocket was sent to the moon.

The rocket launched on October 4 put into lunar orbit an automatic station called Luna-3. Its last stage now carried a cylinder, instead of a ball, with concave ends.

Korolev and other scientists had worked out a route for the station that would enable it to pass over the invisible side of the moon. On October 6 the station came within five or six thousand kilometres of the lunar surface. Luna-3 was oriented to the centre of the moon and its cameras photographed the invisible surface for 40 minutes. Those were minutes of tension and excitement which were richly rewarded by results: all the signals were received and deciphered, the pictures thus obtained were excellent.

Later the astronomers pinpointed 107 objectives on the photographs, in addition to those already known from previous observations. The photographs were also used for making maps of the reverse side of the moon.

Korolev read the map of the moon as if it were a poem. When he had a free minute he would come to the map and thoughtfully survey the seas and craters that had come before the eyes of man for the first time.

Preparations Complete . . .

Preparations for man's orbital flight were nearing completion. The heart of the project was a craft that could be controlled by a pilot. The designers headed by Korolev put in a lot of effort to create a manned spaceship. Gradually the design of the ship took shape in the minds of its creators — the command module which was to be brought back to earth through the thick layers of the atmosphere, and the heavily-instrumented service module.

Every new concept, every new term was thoroughly discussed at the Design Bureau and was considered by Korolev personally. He would thoughtfully sketch the globe and would indicate the thick layers of the atmosphere with a wavy line. Then he would draw the trajectory: his pencil "rose to the cosmos" and then made "a steep descent to the earth". That is how he pictured ballistic flight. Could this be consid-

ered a space flight? It could if it continued for any length of time, of course. But then how would it differ from the flight of an ordinary rocket plane of the old days? Korolev took his pen and wrote: "What is space flight?" This is what was said in his unpublished article on the subject: "A space flight is the flight of a flying apparatus at a speed equal to or higher than orbital velocity above the thick layers of the atmosphere for a sufficiently long period. This flight is accompanied by loss of natural terrestrial gravity." Shortly before Yuri Gagarin went off into space, on March 19, 1961, Korolev made this observation: "A space flight provides for landing on earth. Otherwise it is just a fall, a shot, etc." Below he made this remark: "Not always onto earth!"

In the course of preparation for a manned flight Korolev paid special attention to the reliability of all the systems of the ship and to the safety of the cosmonaut. This was a complicated problem because every spaceship consists of hundreds of very complicated systems, tens of thousands of units and parts. This means that if a seemingly insignificant element failed, the entire flight might fail. Korolev saw to it that all the rules of technology were observed, that all the systems and units were tested properly many times and in different conditions before they were installed on the ship. Then the ship itself was put to a severe test, and only after all this was

finished did he say that the orbital flight could begin.

The safety of manned flights in space was ensured not only by the reliability of the equipment that was to propel the ship, but also by the unflinching functioning of the life-supporting systems. In 1960 Korolev wrote: "What are the main problems now? First, the lengthy period spent in outer space, and ensuring the necessary biological conditions. Communication and help. Power supply, etc."

Now what does "communication and help" mean? A person going into outer space must at any time be able to make an emergency landing. Depending on the phase of the flight this landing could be made in different ways.

At first the method was developed in Korolev's mind. Then it was tested — first on earth and later in flight.

The shape of the command module to be brought back to earth was of crucial importance. There was a lot of argument. The choice of shape lay between spherical and conical. The designers gathered in the office of a department chief. Korolev listened to the supporters of both ideas but appeared to be in no hurry to make his decision. As usual he did not want to force his will on anybody. The meeting lasted for about an hour.

At the end of the session Korolev summed up the arguments and said:

"I vote for the sphere . . ."

It was also decided to put the

service module inside two truncated hemispheres.

To ensure the correct position and speed of the craft in space, to orient the ship to the sun and to ensure a safe landing, many different systems were worked out. But one of these systems "played a dirty trick", exactly what Korolev had feared, the first time it was put to a test.

This test flight was made on May 15, 1960. The capsule was filled with mice, flies and algae which were to serve as indicators of how outer space would affect living organisms.

At first the experiment proceeded as scheduled. The information beamed back to earth confirmed that the spaceship was in pre-set orbit and that life-supporting conditions were being maintained. On the 64th circuit, on May 19, the research programme was accomplished. The command went out for switching on the retro-rockets and for separating the capsule from the service module. And here the trouble began . . .

The capsule separated but instead of descending climbed to a still higher orbit. The orientation system had failed to send the decelerating impulse in the right direction.

Every cloud has a silver lining. Thanks to this "whim" of the spaceship's equipment, later craft were able to change orbits by signal from earth. In other words, it became possible to make space-

ships manoeuvrable while in flight.

Quite naturally, the system of orientation and landing demanded most of Korolev's attention before the next space shot. This time the capsule contained two dogs — Belka and Strelka. Dressed in special "space suits" the dogs were placed before their automatic feeders. Together with them were 40 mice, two rats, several insects and plants. The second spaceship started off on August 19, 1960, and circled the earth 17 times. Now the most crucial moment arrived when the spaceship was to come in for a landing.

Korolev gave the command for descent.

The order was received on the ship when it was making its 18th circuit. Everybody was excited — how would the braking device work? Radio contact was lost, which meant that the ship had gone off orbit. Korolev communicated with the direction finder installed in the command module of the spaceship. At first there was no signal but then it came through, and the module made a safe landing.

Thus, the dogs Belka and Strelka made a space trip 700,000 km. long and returned to earth.

For the first time a space craft with living creatures on board returned from the cosmos safe and sound. Somebody joked "God exists after all!" Korolev followed up: "If He does He is for the communists!"

Korolev was greatly concerned

about radiation hazard in space. However, the dose of radiation received by the dogs was small. This proved that when the sun is quiescent human beings could safely fly in terrestrial orbit.

On December 1, 1960, the third spaceship went into orbit around the earth, with two more passengers aboard — the dogs Pchelka and Mushka. The take-off and the orbiting went off successfully but all efforts to bring the animals back to earth failed: the descent trajectory had deviated from the pre-set landing path and the spacecraft burned up in the atmosphere.

On December 2, a huge flare-up was observed on the sun. The instruments of the spaceship registered the rising intensity of space radiation for 12 minutes. The information was duly beamed back to earth and were carefully studied by Korolev and other scientists.

"It's safe to fly in space when there are no solar flare-ups," Korolev said, using this fresh data to support the conclusions he had reached earlier.

On February 12, 1961 an inter-planetary station was sent to the planet Venus. On March 9 the fourth spaceship was launched carrying the dog Chernushka, several guinea pigs, mice and frogs. The flight went off successfully and, after one circuit around the earth, the craft was brought back safely. Two weeks later the dog Zvyozdochka made another one-orbit flight in a capsule which

also contained the singing puppet "Ivan Ivanovich". The landing took place in the pre-set area.

"Preparations for a manned flight can be considered finished," said Korolev, summing up the results of all the previous launches.

The "Vostok" Commander

Early in 1960 a new town sprang up near Moscow, popularly known as Zvyozdnyi Gorodok, or the Town of Stars. Fliers who were to be trained for space flights soon began to arrive.

The first group of future cosmonauts will never forget their meeting with Korolev in the spring of 1960.

"Well, my eagles, do you know what you will fly? No, not aircraft but something entirely different," said Korolev.

On the first day of their arrival Korolev spoke to Yuri Gagarin for a long time. The cheerful young lad apparently caught his eye from the start.

Gagarin also took a liking of Korolev. The Chief Designer quickly became popular with the future cosmonauts, because right from the beginning he treated them as his closest assistants.

Later, recalling the first meeting with Korolev, Vladimir Komarov wrote: "The cosmonauts were very excited, for they were to meet the head of the team which was building space rockets and ships. When Korolev came in he spoke to us in a simple and friendly manner, asked each one

of us our name, place of birth, family, what school we had finished. Conversation flowed so easily that we soon forgot that we were talking with the Chief Designer about whom we had heard so much. When my turn came Sergei Pavlovich said: 'And you, engineer-captain, will be commander of a space multi-seater'. He may have said that because I was older than the others and had a higher technical education. At that time I did not believe it was possible. But, as is known, that was exactly what happened later."

Korolev always asked the cosmonauts how they felt during the training sessions.

"Hard, isn't it? But it's necessary, otherwise you'll find it tough up there," he would say, pointing to the sky.

When the cosmonauts arrived at the Design Bureau Korolev led them to the brainchild of his team, the spaceship. He explained that it would be mounted on a powerful multi-stage rocket carrier and would be separated from its last stage when the rocket went into orbit. Korolev also told the cosmonauts something they had not known, namely that the programme of the first flight was designed for one circuit around the Earth. He added that the spaceship could, of course, make more than just one circuit.

After the cosmonauts had familiarised themselves with the ship Sergei Pavlovich said:

"The cosmonaut can make a

landing inside the capsule but he can also leave the ship. We have provided for the possibility of the cosmonauts landing separately from the command module. It works like this. At an altitude of 7,000 metres the cover of the entrance hatch opens and two seconds later the seat holding the cosmonaut is catapulted out of the ship. Almost immediately the parachute system is brought into play. But the cosmonaut will land without the seat, which will be detached from him at an altitude of 4,000 metres. He continues his descent by parachute, having with him an emergency food supply and a pneumatic boat which is automatically inflated. This is in case he lands on water. As soon as he lands he switches on the radio direction finder which will enable us to find him. The command module also comes down by parachute, but it will descend faster than the cosmonaut."

The future cosmonauts were intrigued by the magic seat they had just heard about. After examining the chair and fitting it inside the spacecraft Korolev told the cosmonauts about one more important purpose it could serve — the chair could save the space pilot at take-off. In case of accident it would catapult the cosmonaut to a safe distance.

Everyone admired the chair.

A short time later the cosmonauts flew to the cosmodrome. Korolev was already there. When they met, Korolev asked N. Kamanin, the chief instructor of the

cosmonauts:

"You know you have very little time. What are you going to do now?"

"Begin training sessions."

"Good."

On April 6, 1961, Korolev spoke about the air regeneration system before the State Commission. His speech boiled down to the following: it was necessary to ensure that the system should work for several days although the actual flight might last less than two hours.

At the end of the meeting Korolev and other designers gave the assignment for a cosmonaut to do one orbit around the Earth.

On April 10, the cosmonauts met with the engineers who prepared their ships for space flights. Korolev could not conceal his excitement as he said:

"We are ready for the first manned flight. It has been decided that the first to fly will be Gagarin. Others will follow him later. We will soon witness flights which are important to science, which will benefit mankind. We are firmly convinced that this flight has been well prepared and will be successful."

In the evening, at a meeting of the State Commission which had arrived at the cosmodrome, Korolev reaffirmed that the rocket and the spaceship were ready to fly: "The rocket-carrier and the spaceship have gone through a series of tests at the plant and at the cosmodrome. I have nothing but good to say about the work of the

rocket carrier and the ship."

The last-minute preparations for the flight were made at the launching site. On the night of April 11 and 12, none of the space team specialists went to bed. At 3 o'clock in the morning the final examination began. At 5 a.m. Yuri Gagarin and his stand-in Herman Titov were awakened.

Just before Gagarin put on his space suit to go to the bus which was to take him to the launching site, Korolev entered the room. "It was the first time that I saw him look concerned and tired, possibly from a sleepless night," wrote Gagarin later. "And still a gentle smile touched his firmly set lips. I wanted to embrace him like a father. He gave me some advice and recommendations which I had never heard before and which could be useful in flight. And after seeing the cosmonauts and talking to them he seemed more cheerful."

Gagarin was right that Korolev felt concerned about the cosmonauts. He even asked Kamanin to inform him more frequently about their mood and condition. In an outburst of feeling he said: "Now it's a man who is going to conquer space. Our Soviet man!"

When the bus took the cosmonauts to the launching site Yuri Gagarin raised his hand to his pressure-helmet and reported:

"Comrade chairman of the State Commission, pilot-cosmonaut senior lieutenant Gagarin is ready for the flight in the

world's first spaceship, *Vostok*!"

The time of blast off was drawing near. Korolev was at the control panel, a microphone in his hands.

Korolev: How do you feel, Yuri Alexeyevich?

Gagarin: I feel fine. I am checking the telephones and the loudspeakers. Seem to be in order. I am switching over to the telephone.

Korolev: I understand you. Everything here is proceeding normally, the craft is being readied for take-off. All is well.

Gagarin: Your message is clear. I am sure everything is fine.

Korolev: Yuri Alexeyevich I just want to remind you... (gives advice). So don't worry.

Gagarin: I've understood everything. I'm calm...

Korolev: I saw you on the TV screen — you look cheerful. How do you hear me?

Gagarin: I can hear you very well. I feel fine and cheerful. Ready for the start.

Korolev: Readiness Number One, how do you hear me?

Gagarin: Clear. Readiness Number One. Have taken my place at controls.

Korolev: Clear.

Gagarin: Off we go. Everything is normal. Feeling fine, I'm in high spirits, everything is under control.

Korolev: All of us here wish you happy landing...

Gagarin: Goodbye. See you soon, friends!

Korolev: Goodbye. See you soon!



Gagarin: The vibration is growing, it's getting a bit noisier...

Korolev: Time now — 70 seconds (after take-off).

Gagarin: Roger. Seventy seconds. Feeling all right. The flight is proceeding fine. The G-force is growing. All going well.

Korolev: Hundred. How do you feel?

Gagarin: Fine. How are you?
Korolev: Both speed and time are on schedule. How do you feel?

Gagarin: Feeling quite well...
Korolev: Everything's all right. The craft is proceeding on course.

Gagarin: I've jettisoned the front cap. I can see the earth. The G-force has grown slightly. Feeling fine and cheerful.

Korolev: Good for you. Excellent. All well.

Gagarin: I can see clouds over the earth, feather clouds and cumulus clouds, I also see their shadows. Very beautiful. Just beautiful. Do you hear me?

Korolev: We can hear you well. Continue the flight.

Gagarin: The flight is proceeding well... Slow spin. I can take it very well. The overloading is slight. Feeling fine. Watching the earth from the porthole. It's covered with clouds.

The launching site Baikonur. To the right of Korolev is the physician-cosmonaut, Boris Yegorov who, together with pilot-cosmonaut Vladimir Komarov and scientist-cosmonaut Konstantin Feoktistov, is preparing to go into orbit.

Korolev: Everything is normal. We understood everything, can hear you excellently.

The son of the earth was now looking at his native planet from outside. And suddenly...

"Radio contact was lost," recalls N. Kamanin. "We knew that this was only for a few seconds, for a short moment. Now another tracking station was to make contact with him and we would hear, would definitely hear about what was going on in the spaceship, would be able to speak to Yuri... These few seconds seemed like eternity... I wished they would pass quicker... Here at last!"

From the command post of the cosmodrome Sergei Pavlovich and his assistants were directing the descent and landing of Vostok. The fading short-wave signals from the ship showed that it had entered the dense layers of the atmosphere. And when the radio direction transmitters of the Vostok went on the air there was now no doubt in anybody's mind that the spaceship had landed safely. Soon the report came in: "Yuri and the spaceship landed at 10 hours 55 minutes near the village of Smelovka, a short distance from Saratov."

People at the cosmodrome were congratulating one another, were shouting, kissing... In the evening Korolev and other designers met Yuri in a small house on the bank of the River Volga.

Man rose into outer space, flew around our planet and returned home.

A Full Day in Space

In May 1961 the author of this account met Korolev and saw Yuri Gagarin and other cosmonauts in a sanatorium at Sochi.

Even while resting Sergei Pavlovich never stopped thinking about another manned flight into space. The main problem that bothered him was how many circuits should this flight last? Medical and other specialists were of the opinion that the flight should not last more than three circuits. Their conclusion was based on the fact that after three circuits the spaceship would still land on Soviet territory. But the more circuits the farther away the landing site would be. Between the 8th and the 13th circuits the ship would land in the Atlantic Ocean. And it would be only in 24 hours that the ship would be able to make a landing at home. And nobody was considering such a long flight.

N. Kamanin and the outstanding medical expert V. Yazdovsky went to Sochi to make this proposal: the second flight should consist of three circuits. But Korolev vehemently objected.

"The flight will last a full day and night. We need a deep probe. It is not enough if the cosmonaut just whips into space. He must live and work there. Only then can we say that we have cast anchor in space orbit."

Finally a 24-hour programme was endorsed. It was suggested that Yuri Gagarin's stand-in,

Herman Titov, would pilot the second sputnik.

After his holiday with the cosmonauts on the Black Sea coast, Korolev plunged into work again. That was in June. Preparations were under way for the second manned flight. Both the carrier and the ship were undergoing thorough check-ups.

On July 31 Korolev flew to the cosmodrome to supervise the second manned trip around the earth. Again he was busy examining the equipment and seeing to it that the cosmonauts were in "top cosmic" form.

Titov's flight was given detailed coverage in the press — he made 17 circuits around the earth, clocking 700,000 kilometres.

When he was in his 17th orbit Titov heard Korolev's familiar voice in the earphones:

"Eagle, are you ready for the landing?"

"Yes, I'm ready!"

And again the whole world applauded.

Rendezvous in Orbit

On the morning of August 11, 1962, the rising sun flooded the steppe with light and played on the shining surface of the spaceship and the trusses that held it in an iron grip.

The faces of the people who came to wish happy landing to the cosmonauts reflected the momentousness of the event. Standing next to Andrian Nikolayev, dressed in a space suit, was Pre-

sident of the USSR Academy of Sciences Keldysh, Korolev, and other members of the State Commission and spacecraft designers.

At 11 hours 30 minutes Moscow time the rocket serenely took off and soared into the sky. Andrian Nikolayev reported from the spaceship: "Everything is under control."

When newsmen asked Korolev about the purposes of the launching of Vostok-3, he said:

"The main task is to continue the study of weightlessness and its effects on the human organism in long flight. The second purpose is to prove that a human being can carry out a certain amount of research in the conditions of space flight. For this the Vostok-3 is equipped with all the necessary instruments. And finally, we want to examine all the systems of the spaceship at work, when the craft is in flight, in order to use these data for designing new spaceships."

But there was something that Korolev did not tell the correspondents that day. Soon after Andrian Nikolayev took off he was followed by another ship, the Vostok-4, piloted by Pavel Popovich. He went up on August 12, at 11 hours 2 minutes. Thus began the world's first group flight in space. Also for the first time two spaceships executed a complicated manoeuvre — a space rendezvous.

The experiment made it clear that man can stay in orbit for a long time.

But there was one more heartening development: the cosmonauts could maintain stable radio contact. For this they used ultra-short radio waves which, on earth, can be heard only in conditions of direct visibility. It turned out, however, that in space, radio contact on these waves could be maintained at a distance of more than 10,000 kilometres.

The interior of the flying spaceships was shown by television to Soviet viewers for the first time and, through intervision the cosmonauts appeared on TV screens in a number of European countries. This type of TV broadcasting has come to be known as "cosmovision".

Soon after the flight of Nikolayev and Popovich, Korolev was sent to hospital. He was in pain and the doctors insisted on a thorough medical examination and treatment. After treatment and rest he again plunged into hard work. There were more space shots, and among them the launching of "Luna-4".

Chaika and Yastreb — Seagull and Hawk

On June 14, 1963, at 15 hours Moscow time, Valeri Bykovsky took off in the spaceship Vostok-5. Shortly before the flight newsmen saw Bykovsky at a session of the State Commission.

Speaking at that session were Korolev and other experts. On their recommendations the assignment for the flight was endorsed



Sochi, May, 1961. Yuri Gagarin, with his wife, Valentina, and Sergei Korolev with his wife, Nina, at the Black Sea resort. The picture was taken a few weeks after the historic event when on April 12, 1961, Yuri Gagarin became the first man in space.

and the spaceship commander appointed.

The next day Korolev invited newsmen to come to the launching site.

Korolev spoke of Bykovsky as a well-trained cosmonaut, and then asked this tricky question:

"I wonder if any of you newsmen would like to go to outer space? Not now, of course, but sometime later."

One of the newsmen, a big fat fellow, took a step forward, cast a searching glance at the Chief Designer and said:

"I don't think you will ever take me!"

"Don't worry, we shall dispatch you to space, all right. If your heart permits."

"Ask the cosmonauts to give you their training programme. Don't lose time," joked the others.

"You don't need that, either," continued Korolev. "You will feel even more comfortable than on a plane."

The time of the launching of the Vostok-5 was drawing near and then it turned out that one of the operations had not been done according to the authorised technical specifications. Korolev decided to climb to the entrance hatch and look into the matter himself. One of the experts who was at the launching site that day recalls: "We were told by intercom that Korolev was, to put it mildly, thoroughly displeased. We were bracing ourselves for a sound dressing down. But when Espeece came up he looked very calm and began asking what had happened and what we were going to do to correct the mistake. After hearing us out he gave us a few pointers, told us not to hurry because there was still time and everything should be done as required. He stayed with us until the fault had been corrected."

As is known, the take-off was successful.

After Bykovsky, at 12 hours 30 minutes, on June 16, the first woman space traveller, Valentina Tereshkova, was launched into orbit in Vostok-6.

When Valentina was preparing for the flight Korolev remarked facetiously that all those present, including himself, envied her. Valentina replied jocularly:

"Don't be sad. We'll fly together yet. When I come back

from the cosmos we'll think where we shall fly." As she said this she gave Korolev a bouquet of wild flowers.

Chaika ("Seagull") was the first to finish her flight. She stayed aloft for 70 hours 48 minutes, made 48 orbits, clocking about two million kilometres. Her spaceship, Vostok-6, landed 620 kilometres north-west of Karaganda, in northern Kazakhstan.

Valeri Bykovsky's flight lasted 119 hours and 24 minutes. His spaceship, Vostok-5, made 82 orbits, clocking 3,300,000 kilometres. He also landed in northern Kazakhstan, 540 kilometres north-west of Karaganda. The mechanisms of take-off and descent worked with precision. The telemetric system brought scientists much valuable information.

Korolev was at the command post throughout the entire flight. When the cosmonauts were located after their landing he instructed the pilots by radio:

"Take special care to bring the cosmonauts safe and sound. Do you understand me?"

Speaking about the joint flight of two people in space Korolev stressed the importance of its moral and psychological aspects. The cosmonauts were in continuous radio contact, a fact of tremendous significance: each felt that he was not alone in the cosmos. It was Andrian Nikolayev and Pavel Popovich who had first pointed out how important was

the feeling of having "a friend at your elbow".

Replying to newsmen's questions about the significance of rendezvous in space Korolev said: "The problem of rendezvous and link-up in space is now on the order of the day for cosmonautics. Its solution would enable us to create large orbital stations for space research. They could also be used as a kind of dock for spaceships. Space flights could well be compared with seafaring, as both ocean-going ships and spaceships leave land for a long time. To take on a fresh supply of equipment, fuel and food, or to get assistance when needed, both would have either to return to land (the Russian word "zemlya" means both land and earth) or to meet someone on the way.

"Joint flights are bringing us, step by step, closer to the solution of this problem. So far spaceships have flown along so-called 'self-braking' orbits. This means that no matter what, even if the braking mechanisms fail, the progress of the ship will be retarded by atmospheric friction and, after a comparatively short period it will descend to earth. The only problem is the question of time and place of landing. The existence of docking stations and the possibility of linking up spaceships would enable us to use higher orbits, to widen the limits of cosmonautics..."

Expedition in Orbit

In 1964 Korolev was busy with another project. That was the spaceship called "Voskhod" (Dawn). And this time he again took control of all aspects of the big job of putting all the systems of the future spaceship in working order.

One of the more crucial problems still to be solved was soft landing. Korolev attached particular importance to this. He made frequent calls on the engineers who were working on the parachute system of the ship. There were arguments that centred on whether the parachute system should consist of one or two chutes. Then the soft landing system was put to a whole series of tests. There were difficulties and set-backs. During one such test, due to failure, the spaceship landing was not exactly "soft".

Afterwards Korolev asked cosmonaut Konstantin Feoktistov:

"Are you afraid to fly? The 'ball' hit it hard."

"No, I am not. The soft landing system is reliable. I have faith in it. There was just some minor fault, nothing more."

And that was so. The fault was removed and the machine was again put through a test. But even then Korolev was against launching the Voskhod until the unmanned spaceship carried out the entire programme of the future flight. His colleagues still remember what he said at that time:

"Everything must be worked out down to the minutest detail, everything from A to Z".

Working on the new spaceship project Korolev was particularly exacting and intolerant of shortcomings and human frailty — both in others and in himself. He was especially strict with those he valued most of all, and kept repeating: "Think, think. Never stop thinking!" And working on a problem he was always pleased when his colleagues expressed strong, independent ideas.

He never gave his subordinates and colleagues the feeling that his word was law: he did not hold the notion of the infallibility of the leader's uniform. He always tried to draw a large number of specialists into his creative process.

Once two variants of a project were being discussed. The participants almost unanimously supported the first variant. Korolev also expressed his approval. But here his deputy rose and put forward counter arguments. The unanimity which had been voiced a few minutes before evaporated. Korolev left the question open and with some displeasure said to his deputy:

"Go over your calculations once again and find where you slipped up..." As he said this he got up and left the room.

A little later his colleagues went into his office. Flushed and with tousled hair, Korolev sat in his chair and... smiled as he looked at the blackboard studded with formulae.

"I see that my opponent is right... Good for him. Alone against all of us. And he would not give ground!"

In March 1964 Korolev and his colleagues were preparing for the experimental launching of the "Zond-1" space probe.

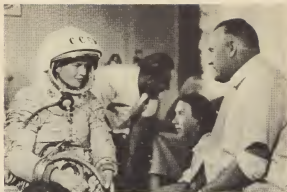
The launching was a success. Its modernised rocket carrier put a heavy satellite into intermediate orbit and later, at a preset point Zond-1 was imparted escape velocity. After that the probe began beaming scientific information back to the tracking stations. Scientists also tested the remote control devices installed on the probe.

Thus days, weeks and months of hard work yielded more information, more results and more solutions to the numerous problems facing Korolev's team.

* * *

Work on the spaceship Voskhod was nearing completion. This craft incorporated the best features of the Vostok spaceships and was in many respects better than its predecessors. In it the cosmonauts could, for the first time, fly without space suits. It had no catapulting systems, because this craft was designed to make soft landings. It carried new instruments, TV and radio equipment.

On October 12, 1964, at 10 hours 30 minutes Moscow time the spaceship Voskhod-1, carrying



Balkonur, June 16, 1963. In an hour or two, Valentina Tereshkova, the first woman in space, will rendezvous with Valeri Bykovsky who is already up in Vostok-5. In the meantime, before climbing into the cabin of her spacecraft, Vostok-6, Valentina has time for a joke with Sergei Korolev.

three men, was launched into space.

And again Korolev was at the command post, in a spacious room with the ever-present maps, charts, tape recorders and TV sets. Another communication session was in progress. He asked the ship's commander Vladimir Komarov, flight engineer Konstantin Feoktistov and Dr. Boris Yegorov how they felt, and waited for their brisk replies:

"Feeling excellent!"

The next question was to Feoktistov:

"How's the programme being carried out?"

"All according to schedule. Time is flying and there is a lot of work to do."

"Well, in that case you'll have to do some overtime. But remember, you won't get any extra pay for it."

"Then put it down as my free contribution to our common good."

During one of the communication sessions Vladimir Komarov made the following request of Korolev:

"We have seen a lot of interesting things. We would like to polish up some of our observations. The crew are asking you

to prolong the flight by another day."

"There are more things in heaven and earth, Horatio," replied Korolev with a quotation from Shakespeare. "But we'd better stick to the programme!"

The successful flight of the crew and the soft landing of the Voskhod confirmed the reliability of its design, systems and equipment. The three-seater landed with a high degree of precision and at the moment of impact its speed had been reduced to almost zero. The crew did not suffer from excessive stress and felt fine without the space suits. For the first time a whole team of space pioneers orbited the earth aboard one ship.

In the Black Ocean

The time had come for man to leave his ship while in orbit. This problem had also been solved by the team headed by Sergei Korolev.

To carry out this experiment two men were to go into space so that one could, in case of need, help the other pilot. That was a very important point for the "walk in space" programme, the first of its kind.

Korolev believed that a cosmonaut who left the spaceship in flight should be able to carry out all the necessary repair jobs, including welding and other difficult operations.

"This is no fantasy but a ne-

cessity," he said. "And the more we go to outer space the more this necessity will make itself felt. A situation might arise when one spaceship will have to give assistance to another ship. How should it be done? For spaceships carry a strong heat insulating armour. A spaceship can be approached in flight, but this does not necessarily mean that anything could be done to it, except, maybe, that its hatch could be opened. But then the people inside the ship would die.

"This means that an elaborate locking system had to be devised to enable the people inside the spaceship to get out if necessary, in order to render such assistance.

"That's how the design of the Voskhod-2 gradually took shape. Its main elements consist of the airtight command module and the highly instrumented service module. The command module is equipped with life-supporting systems, and the ship as a whole has all the necessary apparatuses, including television cameras, to ensure smooth work of the mechanisms. Just as on all the previous spacecraft, the Voskhod-2 has reliable heat-insulating armour. The command module has three hatches with heat resistant glass. On landing the cosmonauts could get out of the ship through any of them.

"Only the command module is supposed to return to earth, while the service module is doomed to burn up in the dense layers of the atmosphere, with all the appa-

ratases and instruments it contains — radio instruments, liquid fuel braking mechanisms, the heat regulating devices, and power batteries. Installed on the exterior surface of the service module are radio antennae, cylinders of liquid gas, the engines of the orientation system and solar radiators.

"The ship also carries a reserve gunpowder retro-rocket which duplicates the main braking mechanism.

"But the main element which distinguishes the Voskhod-2 from all other spacecraft is its locking chamber. It has two hatches — one that opens into the command module and the other into the space void. Both hatches can be opened either manually or with the help of electric motors.

"Installed both inside and outside the command module are movie cameras which are to film the 'walk out' of man through the 'sixth ocean'. After his return to the spaceship the locking chamber is to be separated from the craft and burnt up in the dense layers of the atmosphere.

"The pilot who is to go out into space and the other cosmonaut who stays inside the ship wear the same kind of space suits. The commander has to be ready to go out into space and help his team-mate, if necessary. Special attention is paid to the hermetic sealing of the space suits. Its outer cover consists of several layers and the pressure helmet has two airtight glass

shields. Special film protects the cosmonauts from the blazing sun. On the back the cosmonaut carries a portable cylinder of oxygen."

This time again the spaceship was to make a soft landing.

The date and time of the flight were at last fixed and the crew appointed: the commander was Pavel Ivanovich Belyayev and the man who was to walk through space was Alexei Arkhipovich Leonov.



Several days before the flight of the Voskhod-2 Korolev told Academician Blagodarov: "Even when everything seems to be checked, there still is a degree of risk, and this degree gives me no peace of mind."

In a letter to his wife, Nina

Ivanovna, he wrote from the cosmódrome in March, 1965:

"We are trying to do everything slowly but thoroughly. And our motto is to spare our men. May we have the strength and skill to always be able to do this, although this might go against the theory

One of the favourite guests at the wedding of Valentina Tereshkova and Andrian Nikolavov is naturally Sergei Korolev. Among the guests of honour are Marshal Malinovsky, then Minister of Defence, Mstislav Keldysh, President of the USSR Academy of Sciences, and many others.

of knowledge, the knowledge of life. And still I have faith in success; all my efforts and my mind, knowledge and experience are now bent on anticipating and forestalling the worst that is lurking at our every step into the unknown."

Even the minutest, seemingly insignificant faults in the work of the equipment were analysed most meticulously. One of the take-off technicians recalls this incident:

"Once when a space probe that was to take some instruments into the cosmos was being prepared for a flight, the light signals on the tester suddenly went out. We found the fault very quickly. The fault could not have possibly affected the work of preparing the spacecraft for the flight. The fault, as I say, was removed and the launching proceeded on schedule. All the instruments on board worked perfectly.

"The next day Korolev met me and asked: 'Did you check out the defect?' I confirmed the correctness of the previous day's examination. Then he said: 'Let's go to the laboratory and reproduce the whole situation.' We again came to the conclusion that the fault in the signalling system could not detract from the excellent performance of the system. Only after this did Korolev calm down."

And this time, too, everything was checked down to the minutest

detail and Voskhod-2 went up on schedule, on March 18, 1965, at 10:00 a.m. Moscow time.

Here is what Alexei Leonov wrote about his unique experience:

"My flight together with Pavel Ivanovich Belyayev was preceded by gruelling preparations, in which Korolev took the keenest interest. He considered, naturally, that the main thing about the experiment was the walk in space. For this it was necessary to test the space suit, the autonomous life-supporting system, to find out the effect of sharply changing temperatures varying from -130 to $+140$ degrees on the human organism, and its behaviour in vacuum conditions. The idea of the experiment was to see if man was able to do anything in the open space of the cosmos, for the success of future space travel largely depends on his ability to assemble orbital stations and even heavier structures.

"My space suit was a ship in its own right, scaled down to the size of the human body.

"The crew was training hard. Korolev was often present at our training sessions and would never let even a minor thing go unnoticed. In 1964 the latest in space equipment was demonstrated at the cosmodrome. Belyayev and I were to imitate a walk in space. I put a space suit on top of my own, but thought it was not necessary to don the protective cover,

because it hung clumsily and made me look very awkward. However, Korolev insisted that I put on the cover and added that I would soon know why. I did as he told me and crawled into the spaceship. When my turn came to walk out I found it difficult to climb through the locking chamber because I kept on catching on the numerous projections and sharp corners. And here I realised how I might really get in trouble if I did not have a cover for my space suit with its thick cording.

"When the spaceship separated from the rocket carrier we began preparations for the main item on the programme. We were over Africa when I opened the inner hatch of the locking chamber. Immediately the command module was flooded with light as bright as that of arc welding.

"Pavel Ivanovich cautioned me: 'Don't be in a hurry, it's too early, yet'. Finally the moment came as the Voskhod approached within TV visibility range. 'Now it's time,' said Pavel Ivanovich.

"I paused on the edge of the lock and thought. It occurred to me that two flat surfaces pressed together in a vacuum cannot be easily separated. And what would become of me? Shall I get tacked on to the lock, and shall I be able to separate the palms of my hands?

"I spread out my arms and waved them a little. They seemed

all right. And when I heard Korolev's voice from the earth I perked up, pushed away from the lock and floated off. I don't know how else I could describe this sensation.

"One side of me was roasting at a temperature of $+136$ degrees, while the other side was in deep freeze at -140 degrees. The vacuum here was even higher than on the moon.

"While I was thus floating next to the ship I had flown the distance between the Black Sea and the Sakhalin Island. I wanted to stay out longer but the ship would soon sail into the Earth's shadow and then I would have had to tumble about in pitch-darkness. That is why Korolev ordered me to return to the ship.

"I wanted to get into the lock in one go but could not. I took off my cinecamera and threw it into the hatch, but it floated back, I tried to push it in again but it would not stay inside the ship. I would have hated to leave it in space and lose the film I had shot. And now when I watch this film I somehow can't believe that it was me freely walking in outer space.

"And how beautiful our earth looks from up there! I saw farm fields, some were brighter than others, depending on the ripeness of wheat. It would take just one circuit around the globe to prepare

a full progress report on harvesting.

"Now what did I feel in free flight? When I was thus soaring I felt a tremendous responsibility for the success of my mission. I could not, even for a moment, imagine that I would fail to carry out the assignment."

The Voskhod-2 was the first spaceship brought back to earth without using automatic controls.

"Come on, do it by hand, boys!" The command sanctioned by Korolev came from Yuri Gagarin.

They started another circuit, took over the manual controls, oriented the ship and switched on the retro-rockets.

The cosmonauts heard a loud noise outside the ship. Were they on course? If they misjudged the ship's position in space it would go away from instead of to the earth.

But the falling specks of dust in the ship showed them that everything was correct, that the ship was about to enter the dense layers of the atmosphere.

Now they could see that the service module was disintegrating. The antennae melted and the molten metal streaked down the heat-resistant glass of the hatches.

It came time for the parachute system to go into action. The hatch shot off with a loud bang, the ship shuddered and then slowly came down suspended from parachutes

and landed in a thick forest near the town of Perm in the north-east of the European part of the USSR. Thus Pavel Belyayev, commander of Voskhod-2, for the first time in history landed a spaceship by manual control.

After the flight the results of the mission were summed up. After walking in outer space 5 metres away from the ship Alexei Leonov had examined the surface, watched the earth as it passed below him and then returned to the ship. He spent ten minutes outside, and exit and entry took about the same amount of time. Those twenty minutes were engraved in golden letters in the history of science...

In an article Korolev made the following comment on the Vostok-2 flight:

"Yuri Gagarin's flight ushered in the era of space navigation, while the era of man working in space began last year on that March day when Alexei Leonov stepped out of the ship into the cosmos and freely floated in it."

The Vostok-2 mission over, Korolev plunged into other projects which took up all his time. Under his guidance a number of space probes were prepared and launched — the space stations Luna-5, 6, 7 and Luna-8, the Molnia-1 communication satellite, the space probe Zond-3, the space stations Venera-2 and Venera-3.



Soon he will write in one of his articles: "Yuri Gagarin's flight opened the era of space travel. The era of man's work in space began in March, 1965, when Alexei Leonov opened the hatch and floated out into the void." Sergei Korolev was one of those who inaugurated the Space Age.

The year 1965 was drawing to an end...

The Edge of the Precipice

His mind was generating more ideas, more grandly-conceived plans and schemes. They were no idle dreams but projects as real as many of those which have left the world spellbound... It just needed time and more work to bring them to life, and he knew that. Korolev never stopped thinking about the cosmos, day-time, late at night at home, early in the morning on his way to space experts, rocket builders, cosmonauts or to the cosmodrome to see through another space launching.

In the entrance hall of his home stood a sculpture by G. Postnikov called "To the Stars" with the autographs of cosmonauts on it. He had a large library on the first floor with a little table in the corner under portraits of three scientists he particularly loved and respected — Sergei Vavilov and Igor Kurchatov on top and a little lower, in the centre, Konstantin Tsiolkovsky. All of them faced in the direction of the staircase as if asking the returning Korolev: "Any luck today?"

According to Nina Ivanovna, Korolev was becoming so tired that on coming home he had to pause a little before climbing to the first floor. He would just sit

on a step and call her: "Come here, let's sit on our thinking step."

They would sit in silence for several minutes, and then Sergei Pavlovich would climb to the first floor, go into the bedroom, change his clothes and proceed to his study. There, opposite the door, in the bookcase, stood models of the sputniks and space stations which he had given a start in life. On the bookcase stood a small school globe given to Korolev by a talented rocket engine designer. The inscription on it reads: "I am sending you this little ball, Sergei, in the hope that some time you and I will see our earth this size." Next to it is a model of the Soviet rocket with liquid fuel propulsion which made its maiden flight on August 17, 1933.

Korolev's study was crammed with books, mostly on nuclear physics, mathematics, astronomy and, of course, astronavigation, among them "The Moon", "Rocket Flight", "Space Flight", "Scientific Problems of Artificial Earth Satellites", and a two-volume edition of Tsiolkovsky's works heavily marked by Korolev. In fact many other books bear the marks of his indefatigable labours.

His bedroom was next to his study. Sergei Pavlovich went to bed very late, but early every morning one could see lights in the

windows of his study. He worked particularly hard now, trying to do as much as possible.

But his disease, sarcoma of the rectum, was developing with increasing rapacity. He tired very quickly and was exhausted by profuse bleedings.

The day before going to hospital he came to his office as usual. And the next morning when a car was to take him away he rummaged in the pockets of his coat and asked Nina Ivanovna:

"Did you take two kopecks from my pocket?"

"No."

"Did you clean my suit?"

"Yes."

"Where did the two kopecks go to?"

"Do you want it for the phone booth?"

"No, it's two one-kopeck pieces, they're my lucky charms."

Korolev, a veteran pilot himself, had the old habit of keeping two one-kopeck pieces in his pocket. And when Nina Ivanovna looked into the wardrobe later she saw that the pockets in all his suits were turned inside out.

Nobody asked him any questions at the hospital. At the elevator he was met by a doctor who took him to the fourth floor.

On January 12, on Korolev's birthday, he was visited by his mother and wife. They reminisced

about the old days and about the people they had met. Sergei Pavlovich smiled as he listened to Maria Nikolayevna.

On January 13 the doctor hurried into the ward and announced the results of the histological test.

Sergei Pavlovich was sitting in his bed holding his hands under the knees. His head leaned to one side a bit, as was his habit. To his wife he seemed to believe and disbelieve the doctor's words at the same time... Then he raised his head and asked:

"You are our friend, tell us please, how many years can I live with this?... and he put his hand on his heart which had been acting up for a long time.

"Well, I think about twenty years," the doctor answered falteringly.

Sergei Pavlovich lowered his head:

"Ten years would be enough although there is still such a lot of work to be done."

Yes, there was a lot of work Korolev was planning to do. To write a fundamental book on rocketry, to tell about its past, present and future. He had been planning this book in his mind over the past 10 years. For this he analysed the rich material he had been accumulating from his own experience.

And there was one more dream that remained unfulfilled. That

was to write a book about Tsiolkovsky. His archives contain an old notebook in which he had started this biography. One can only imagine how deeply Korolev would have penetrated into the creative thinking of the man he loved and respected so much.

These plans were to materialise in books, rockets, launchers and spaceships.

That is why he so desperately needed ten more years of life...

The tumour operation was fixed for January 14. The day before Nina Ivanovna visited her husband shortly before dinner time. When she was leaving Sergei Pavlovich said:

"Come again in the evening. We'll have a chat."

In the evening he walked her down to the stairway, kissed her with exceptional tenderness and said:

"I won't go further. Because when you go downstairs you keep waving your hand at me and don't look at the stairs. You could fall that way."

No sooner had she returned home than the telephone rang. Sergei Pavlovich said that everything had been prepared for the operation.

At five minutes to eight in the morning he called again. That was their last conversation. Korolev's

voice sounded weak and tired.

"I was given an injection, and now I'm falling asleep. You will come after the operation as we've agreed, won't you?"

... Nina Ivanovna was waiting leaning against the cold hospital wall. At last she saw him being wheeled into the operating room. Sergei Pavlovich was wrapped up in sheets up to his chin. He was not asleep yet, his eyes were half-open.

That was the last time she saw her husband alive...

Yuri Gagarin spoke of Korolev in these words: "He can overcome anything in his path." But this time it was disease that overcame him — he died of heart-failure during the operation.

On January 16, 1966, Sergei Pavlovich Korolev was buried in Red Square in Moscow.

* * *

The Soviet people will always remember Korolev's prophetic words:

"From the soil of our sacred Motherland, Soviet spacecraft, lifted by powerful rockets, will depart for space more than once. And each flight and each return will mark a great celebration of the Soviet people and of all forward-looking mankind — a victory for reason and progress."

Beginning with this issue, SPUTNIK presents on the inside back cover a series of pictures of Soviet cities. In this issue: Red Square in Moscow.

